

SERVICE MANUAL

Color Video Monitors

Models ZVM-131/133/135/136

The purpose of this page is to make sure that all service bulletins are entered in this manual. When a service bulletin is received, mark the manual and list the information in the record below.

Record of Field Service Bulletins

SERVICE BULLETIN NUMBER	DATE OF ISSUE	CHANGED PAGE(S)	PURPOSE OF SERVICE BULLETIN	INITIALS

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St. Joseph, Michigan 49085

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Characteristics

Description

Color video monitors ZVM-131, ZVM-133, ZVM-135, and ZVM-136 are very similar. They are the same size, have the same appearance (see Figure 1), and use much of the same circuitry. Their main circuit boards and most other boards are similar. A monochrome display can be selected with a switch on all models.

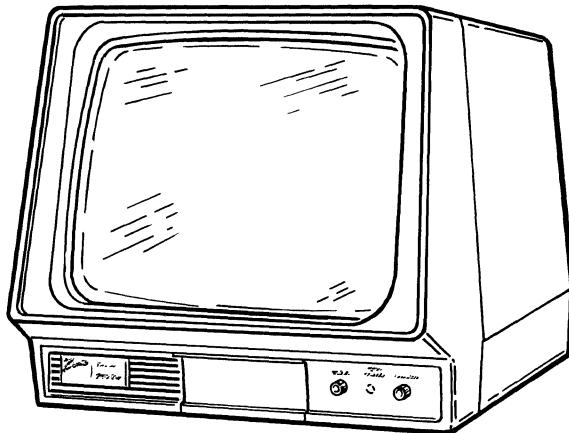


Figure 1
Monitor Front View

The ZVM-131 and ZVM-135 color monitors, together with their export versions, the ZVM-131-E and ZVM-135-E, can accept both RGB and composite inputs from different sources and have full audio capability. The ZVM-131 and ZVM-135 are the same except that the ZVM-131 has a medium-resolution display and the ZVM-135 has a high-resolution display.

The high-resolution ZVM-133 and ZVM-136 color monitors, together with their export versions, the ZVM-133-E and ZVM-136-E, have no audio capability and their inputs are limited to those computers with an RGB output. The ZVM-133 and ZVM-136 are the same except that the ZVM-136 has a high persistence phosphor CRT.

Controls, Indicators, and Connectors

Refer to Figures 2, 5, 6, and 7 for locations of controls, indicators, and connectors.

ZVM-131 AND ZVM-135

Front Panel

Power switch
Power indicator
Volume
Display drive
Black level
Color level
Tint
Sharpness

Rear Panel

GREEN-WHITE switch
RGB/COMP switch
Focus
RGB input connector
Video input connector
Video output connector
Audio input connector
Audio output connector

Internal

Horizontal centering
Width
Horizontal oscillator
Vertical centering
Height
G1
G2
RGB cutoff (main board)
BLUE and RED cutoff (audio/video sync board)
RGB drive
+95 volts
Width selection
Chroma null phase
Black level cutoff
Black level reference

ZVM-133 AND ZVM-136

Refer to Figures 3, 5, 6, and 7 for locations.

Front Panel

Power switch
Power indicator
Brightness
Contrast
GREEN/WHITE switch

Rear Panel

Focus
RGB connector

Internal

Horizontal centering
Width
Horizontal oscillator
Vertical centering
Height
G1
G2
RGB cutoff
RGB drive
+95 volts
Width selection

ZVM-131 Specifications

CRT	13" diagonal, medium-resolution color display
Pixel resolution	390 dots (RGB), 250 dots (composite)
Text capacity	25 lines of 40 characters each
Video resolution	390 pixels horizontal by 240 lines (non- interlaced), or by 480 lines (interlaced)
RGB input	5 volts positive polarity digital signal
Composite input	NTSC 1 volt unterminated, or 75 ohm terminated
Synchronization	± 1 volt to 5 volts horizontal ± 1 volt to 5 volts vertical
Bandwidth	RGB: 6 MHz Composite: 2.5 MHz
Rise time	RGB: 70 nanoseconds Composite: 100 nanoseconds
Audio input	0.35 to 3.5 Vrms, 50 KΩ, AC coupled
Audio output	wired directly to Audio Input
Height	13.75" (350 mm)
Width	15.25" (390 mm)
Depth	15.25" (390 mm)
Weight	38 pounds (17.2 kg)
Power	120 VAC, 60 Hz, 1.23A, (ZVM-131) 240 VAC, 50 Hz, 0.6A, (ZVM-131-E) 95 watts (ZVM-131 and ZVM-133-E)

ZVM-133 Specifications

CRT	13" diagonal, high-resolution color display (high persistence CRT, ZVM-136 only)
Pixel resolution	640 dots
Text capacity	25 lines of 80 characters
Video resolution	640 pixels horizontal, by 240 lines (non- interlaced), or by 480 lines (interlaced)
RGB input	5 volts positive polarity digital signal
Composite input	NTSC 1 volt unterminated, or 75 ohm terminated
Synchronization	± 1 volt to 5 volts horizontal ± 1 volt to 5 volts vertical
Bandwidth	20 MHz
Rise time	70 nanoseconds
Height	13.75" (350 mm)
Width	15.25" (390 mm)
Depth	15.25" (390 mm)
Weight	38 pounds (17.2 kg)
Power	120 VAC, 60 Hz, 1.23A, (ZVM-133) 240 VDC, 50 Hz, 0.6A, (ZVM-133-E) 95 watts (ZVM-133 and ZVM-133-E)

ZVM-135 Specifications

CRT	13" diagonal, high-resolution color display
Pixel resolution	640 dots (RGB), 250 dots (composite)
Text capacity	25 lines of 80 characters (RGB) 25 lines of 40 characters (composite)
Video resolution	640 pixels horizontal, by 240 lines (non-interlaced), or by 480 lines (interlaced)
RGB input	5 volts positive polarity digital signal
Composite input	NTSC 1 volt unterminated, or 75 ohm terminated
Synchronization	± 1 volt to 5 volts horizontal ± 1 volt to 5 volts vertical
Bandwidth	RGB: 20 MHz Composite: 3 MHz
Rise time	RGB: 70 nanoseconds Composite: 100 nanoseconds
Audio input	0.35 to 3.5 Vrms, 50 KΩ, AC coupled
Audio output	wired directly to Audio Input
Height	13.75" (350 mm)
Width	15.25" (390 mm)
Depth	15.25" (390 mm)
Weight	38 pounds (17.2 kg)
Power	120 VAC, 60 Hz, 1.23A, (ZVM-135) 240 VAC, 50 Hz, 0.6A, (ZVM-135-E) 95 watts (ZVM-135 and ZVM-135-E)

ZVM-136 Specifications

The ZVM-136 specifications are the same as ZVM-133 specifications except that the ZVM-136 has a high persistence CRT.

Zenith Data Systems reserves the right to discontinue products and to change specifications at any time.

Installation

ZVM-131 and ZVM-135 Installation

COMPOSITE SIGNAL

1. Connect applicable cables as shown in Figure 2.

NOTE: A weak composite signal may not produce sufficient contrast and brightness. Connecting the composite signal to the VIDEO OUT connector will provide higher gain for more contrast and brightness.

2. Set the RGB/COMP switch to COMP.
3. Select green or color:
 - If the monitor is to be used for text display, select green with the GREEN/WHITE switch.
 - If the monitor is to be used for graphics display or combined text and graphics display, select color by switching the GREEN/WHITE switch to WHITE.
4. Perform the following adjustments for a color display when using a composite signal from a signal source such as a video cassette recorder.
 - a. Turn the COLOR LEVEL control all the way counterclockwise to change the color display to black-and-white.
 - b. Turn the DISPLAY DRIVE control to the mid-range position.
 - c. Turn the BLACK LEVEL control to the midrange (detent) position. This will cause the area of the display intended to be black, to become black.
 - d. Adjust the COLOR LEVEL control to give the desired amount of color to the display.
 - e. Adjust the TINT control for the most pleasing colors.
 - f. Adjust the DISPLAY DRIVE control for the desired brightness level.
 - g. If the dark areas, color areas, or both, appear faded or washed out, turn the BLACK LEVEL

control counterclockwise. If the light backgrounds and colors appear too dark, turn the BLACK LEVEL control clockwise.

- h. Set the SHARPNESS control for the preferred sharpness.

RGB SIGNAL

1. Connect applicable cables as shown in Figure 2.
2. Set the RGB/COMP switch to RGB.
3. Select green or color:
 - If the monitor is to be used for text display, select green with the GREEN/WHITE switch.
 - If the monitor is to be used for graphics display or combined text and graphics display, select color by switching the GREEN/WHITE switch to WHITE.
4. Perform the following adjustments for a color display when using an RGB signal. You will need a color bar chart which can be generated from the ROM in a Z-100 or Z-100 PC Series Computer, or by using the customer demonstration disk in a Z-100 PC. (See the Servicing section.)
 - a. Turn the DISPLAY DRIVE control to the mid-range position.
 - b. Turn the BLACK LEVEL control to the midrange (detent) position. This will cause the areas of the display intended to be black, to become black.
 - c. Adjust the DISPLAY DRIVE control to the desired brightness level.
 - d. If the dark areas, color areas, or both, appear faded or washed out, turn the BLACK LEVEL control counterclockwise. If the light backgrounds or colors appear too dark, turn the BLACK LEVEL control clockwise.

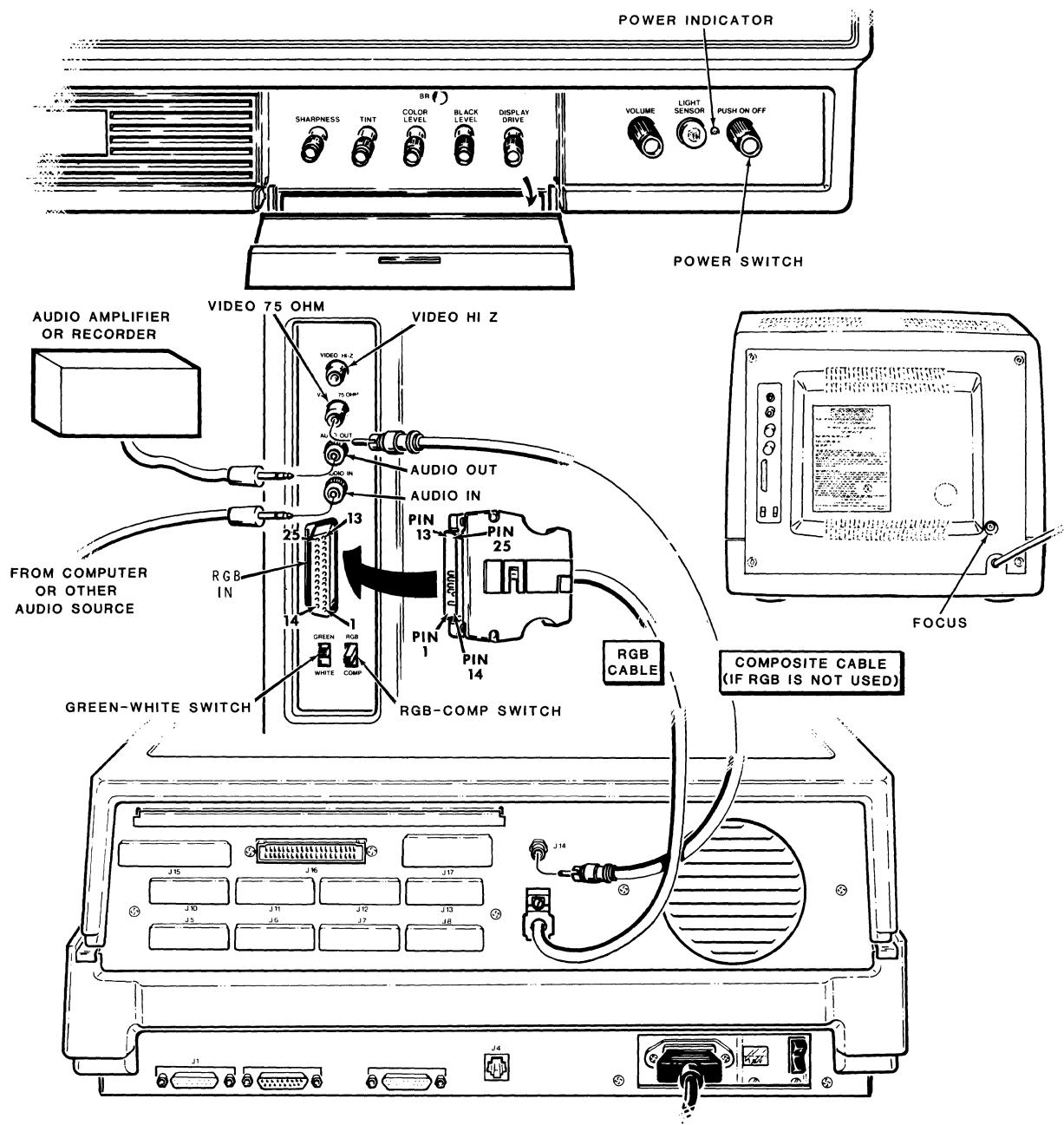


Figure 2
ZVM-131 and ZVM-135
Controls and Connectors

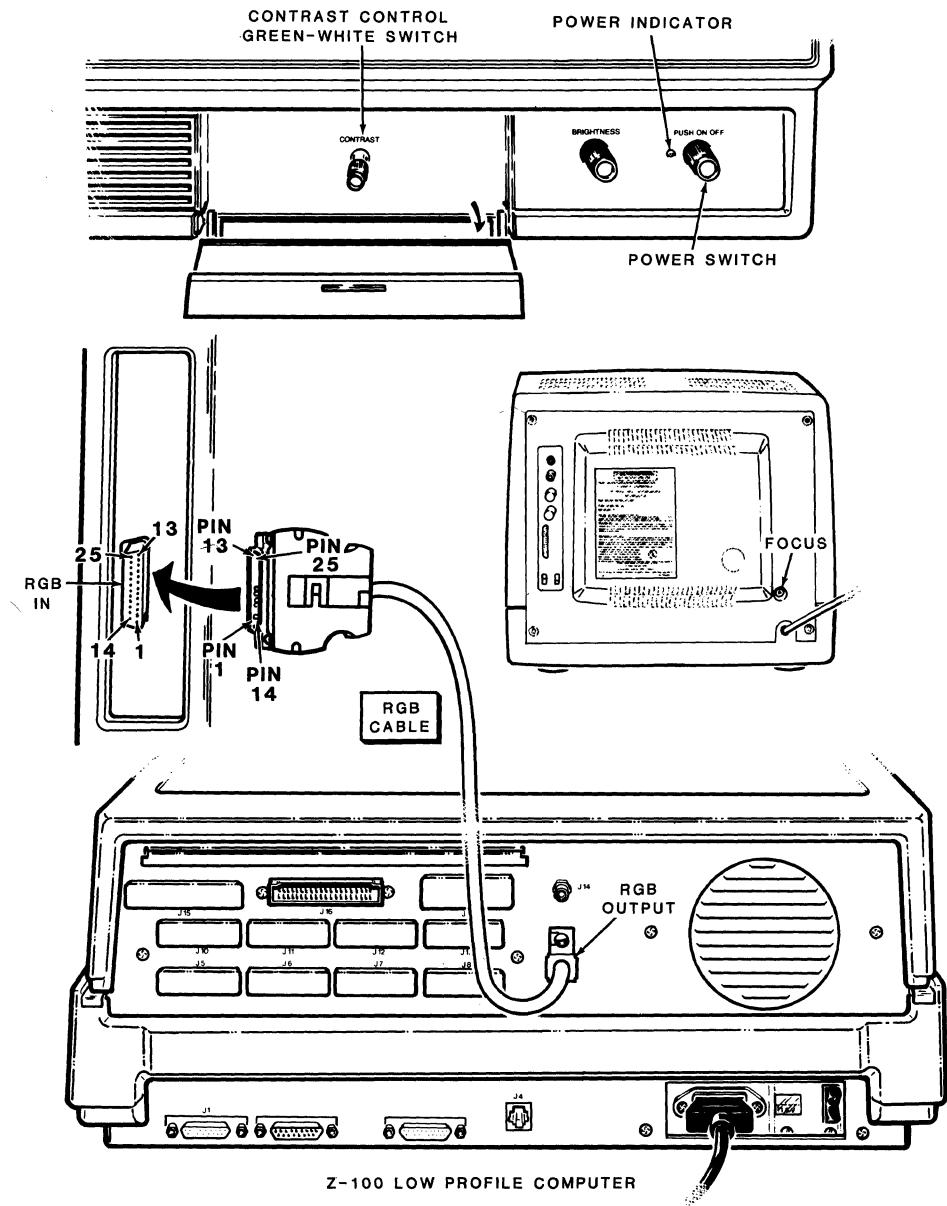


Figure 3
ZVM-133 and ZVM-136
Controls and Connectors

ZVM-133 and ZVM-136 Installation

1. Connect the cables as shown in Figure 3.
2. Select green or color:
 - If the monitor is to be used for text display, select green by pushing the CONTRAST-GREEN/WHITE control.
 - If the monitor is to be used for graphics display or combined text and graphics display, select color by pulling out on the CONTRAST-GREEN/WHITE control.
3. Turn on the computer and monitor power switches. The power indicator on the front of the monitor should light.
4. After the monitor has warmed up, adjust the BRIGHTNESS control for the desired display brightness.
5. If the monitor is to be used with a personal computer, display the PC color bar from the ROM and adjust the CONTRAST-GREEN/WHITE control so that the bottom eight color bars have the desired color intensity.

Circuit Descriptions

Refer to the block diagram, schematics, and waveforms in the Servicing section.

ZVM-131 and ZVM-135 Circuit Boards

Refer to the block diagram in Figure 8.

MAIN BOARD

The main board generates start-up and operating voltages for itself and for other boards. Also, the RGB drive and cutoff voltages and the horizontal and vertical drive voltages are generated by the main board. See the following detailed description.

Start-Up and Operating Voltages

Line voltage is supplied to the main board through connector 3R8. The AC voltage is then routed through fuse FX3201 and a LCI (line conducted interference) choke. The LCI choke, in conjunction with capacitors CX3250 and CX3258 are to prevent noise generated within the monitor from being fed back into the AC line. The power switch is located across pins 2 and 3 of connector 3S8.

Degaussing Circuit

Since externally generated magnetic fields can cause the mask inside the CRT to become magnetized, the CRT is automatically degaussed each time the monitor is turned on.

Degaussing is accomplished by passing AC current through the degaussing coil wrapped around the CRT. The average value of the AC current is zero and therefore does not allow residual magnetism to remain on the mask of the CRT.

The degaussing coil is connected to the main board by connector 3T8. A positive temperature coefficient thermis-

tor (R3245) controls AC current flow through the degaussing coil. When monitor power is turned on, a high AC current will flow from one side of the AC line through the degaussing coil, diode CR3210 or CR3211, and through thermistor R3245 to the other side of the AC line. This high AC current demagnetizes the mask and then quickly drops to a value of near zero due to the heating and subsequent high resistance of R3245.

Power Supplies

When the power switch is closed, AC voltage is applied to the main board. The AC voltage goes to a simple bridge rectifier comprised of diodes CR3231–CR3234. The output of this bridge rectifier circuit acts as a source for some of the other power supplies.

WARNING: The bridge rectifier circuit is referenced to hot (AC) ground and is considered the hot part of the chassis. Therefore, an isolation transformer should always be used whenever the monitor is serviced to prevent injury and damage to the monitor and/or test equipment.

+150 VDC Supply

When monitor power is first turned on, the first power supply to develop output voltage is the +150 VDC supply. This is the B+ power for the H.O.T. (horizontal output transistor) located on the high voltage and horizontal sweep circuit board.

Several oscillators must be operating before additional power supplies will work. For example, the horizontal oscillator must be operating and driving the H.O.T. before high voltage can be generated.

+26 VDC Supply

Transformer T3201 located on the main board is used as a start-up transformer to provide the necessary voltage to get the horizontal oscillator operating. AC current from the secondary winding of T3201 is rectified by diode CR3224. Only the positive alternations through CR3224 produce voltage as the negative alternations are shunted to ground by CR3219. This half wave rectifier circuit supplies +26 VDC to the sync processor IC3401. An oscillator within the sync processor then begins to operate, sending the horizontal drive signal to pin 5 of IC3401.

+12 VDC Supply

The regulated +12 VDC supply is derived from the +26 VDC supply and is used to power most of the transistors found on the main board. Transistor Q3200 is the active regulator whose emitter supplies 12.7 VDC. Current flow through CR3205 produces a proportional voltage drop across the voltage divider comprised of resistors R3203 and R3202. The base of transistor Q3201 is connected to the middle of the voltage divider and therefore detects changes in output voltage at the emitter of Q3200. If the output voltage decreases, the current through R3203 and R3202 decreases and therefore the voltage at the base of Q3201 decreases. When this occurs, conduction through Q3201 decreases effectively raising the voltage at the base of Q3200. Regulator Q3200 is driven harder, thereby increasing its output voltage and current-delivering capability.

If the output voltage rises above +12 VDC, the current through resistors R3203 and R3202 increases and causes the voltage at the base of Q3201 to increase. This transistor is forced to conduct harder which lowers the voltage at the base of Q3200, and therefore its output voltage at the emitter.

RGB Drive and Cutoff Voltages

The RGB signals are processed by the RGB gain control board and are then interfaced to the main board through connector E.

The RED signal is supplied to the base circuit of emitter follower transistor Q2501. During its quiescent state, the base of Q2501 is biased to approximately 11.3 volts as determined by the voltage divider comprised of resistors R2501 and R2502.

When an active-low RED signal drives the base of Q2501, the emitter of Q2501 reproduces the signal and drives the base of Q2502 through potentiometer R2506. This potentiometer establishes the bias voltage at the base of Q2502 and therefore is used to vary the RED signal drive. The RED signal cutoff voltage is adjusted by potentiometer R2505 which is located in the emitter circuit of Q2502.

The collector of Q2502 conducts the inverted RED signal to the base of emitter follower transistor Q2507 which drives the signal through resistor R2550 to pin 4 of connector A.

The BLUE and GREEN signal drive circuits function in exactly the same way as the RED signal circuits.

Composite Drive

The composite signal at pin 2 of connector C goes to the base of emitter follower transistor Q3404. Capacitor C3462, in conjunction with zener diode CR3409, protects the base of Q3404 from over-voltage conditions. Resistors R3467, R3468, and R3470 determine the bias voltage on the base. The composite signal goes from the emitter of Q3404 to pin 27 of the sync processor (IC3401). Pin 16 of the sync processor drives the resulting signal to the base circuit of Q3405. The collector of Q3405 supplies each of the drive level adjustment potentiometers with the signal.

Composite Vertical Sync

The sync processor adjusts the vertical signal with respect to the horizontal signal, to provide properly synchronized CRT scan.

If either positive or negative vertical sync is configured, the signal is supplied from pin 2 of connector E to the base of common emitter transistor Q3401. The inverted signal at the base of Q3401 goes to the base of common emitter Q3402 and is then applied to pin 28 of the sync processor.

Composite Horizontal Sync

The sync processor adjusts the horizontal signal with respect to the vertical signal to provide a properly synchronized CRT scan.

If either positive or negative horizontal sync is configured, the signal is supplied from pin 1 of connector E to the base of common emitter transistor Q3403. The inverted signal at the collector of Q3403 goes to the base of emitter follower Q3404. The signal is then supplied to pin 27 of sync processor IC3401.

Horizontal and Vertical Drive Outputs

The sync processor, IC3401, contains horizontal oscillators, horizontal automatic phase control (APC), horizontal output driver, vertical oscillator, and vertical output driver.

The vertical output of IC3401 (pin 14) drives a stacked pair of transistors (Q2101 and Q2102) for vertical scan generation. This vertical output goes to connector 3G3 to supply the sweep assembly.

The horizontal drive output of IC3401 (pin 5) also is routed through connector 3G3 to the sweep assembly where it will drive the H.O.T.

AUDIO/VIDEO SYNC BOARD

The composite video signal is supplied at the rear of the monitor to either the video input connector or to pin 20 of DB-25 connector. This signal is processed in IC1301 and supplied to the main board at connector E after passing through the GREEN/WHITE switch.

The RGB and intensity signals are supplied at DB-25 connector. The audio/video sync board processes various forms of signals including Apple 4-bit matrix, PC intensity function, and RGB from a Z-100 computer.

Synchronization (sync) signals of positive or negative polarity, including composite, are supplied at DB-25 connector, processed at transistors Q1723 and Q1726, and supplied to the main board at connector D.

The audio signal is supplied to either connector 9E4 or at pin 18 of DB-25 connector. The signal is converted from digital to analog in IC1451 and then goes to the speaker through capacitor C1451.

HIGH VOLTAGE AND HORIZONTAL SWEEP BOARD

This board will be referred to as the sweep board in the following text. The horizontal drive signal originates in the main board, enters the sweep board at connector 3G3, goes to forward driver transistor Q3206 and reverse driver transistor Q3209, and then to transformer T3205. The output of T3205 goes to the H.O.T. through connector 3R3 with the H.O.T. output going to the sweep board through the same 3R3. From connector 3R3, the H.O.T. output goes to the width step board through connector 3S3. The H.O.T. output also goes to the horizontal output transformer TX3204 where the following voltages are generated; CRT filament, CRT high voltage, Focus, G2, 170 Vpp, 60 Vpp, and Video B+.

The vertical output, which originates in the main board, goes to the yoke through the sweep board after passing through connectors 3G3 and 2A3.

WIDTH STEP BOARD

The horizontal sweep goes to the width step board before reaching the horizontal windings of the yoke. Coarse width selection is made at this board by the placement of P1 and P2 jumpers as explained in Alignment and Adjustment in the Servicing section.

VIDEO OUTPUT BOARD

All outputs of this board go to the CRT socket which is on this board.

The RED, GREEN, and BLUE signals from the main board enter at connector 5A2 and go to transistors Q5102, Q5103, and Q5101 to drive the CRT.

The following voltages are supplied by the sweep board:

- The CRT filament voltage
- G2 voltage to connector 5X3
- Focus voltage through a pigtail connector to the CRT

The +120 VDC transistor supply voltage along with G1 and BASE voltage are supplied to the video output board by the main board.

ZVM-133 and ZVM-136 Circuit Boards

Refer to the block diagram in Figure 9.

RGB GAIN CONTROL BOARD

The RGB digital signals enter the monitor at input connector DB- 25 and then go to the RGB gain control board connector 8A7. The intensity (I) signal also goes to connector 8A7 if a PC- compatible computer is used.

RGB Signal Input

The RGB signals are then applied to hex buffer/driver IC1700. When either the RED or GREEN signals are active (low), they are outputed at pins 2 and 4, respectively, to the bases of common collector transistors Q1703, and Q1704. Base current drive for transistor Q1703 (RED) is derived from the +12 VDC supply, through resistor R1712, diode CR1704, and buffer IC1700. Similarly, base drive for Q1704 (GREEN) is derived through resistor R1712, diode CR1703, and buffer IC1700.

When the BLUE signal is active, the base of common emitter transistor Q1709 is driven through resistor R1711, causing the transistor to conduct from emitter to collector. When this occurs, the +12 VDC supply is loaded, and therefore reduces the RED and GREEN signal current drive capability. The gain on each respective signal is

therefore equal to each other. The BLUE signal drives the base of Q1705 through pin 6 of buffer IC1700.

RGBI Input

The intensity bit is used to enhance the hue of a particular color by providing additional drive to the displayed color. The displayed color is therefore intensified on the face of the CRT and takes on a different hue. In this manner, as many as 16 different colors can be displayed when using a PC.

The intensity bit is applied to pins 1 and 3 of hex buffer/inverter IC1700. When these signals are active, they force the output at pins 8, 10, and 12 of IC1700 low. This 3-bit combination of data goes through diodes CR1707, CR1708, and CR1709 to D/A converter IC1723. The D/A converter processes the data and provides additional drive voltage at pins 8 (RED), 2 (GREEN), and 5 (BLUE). This voltage increases the bias on the bases of common collector transistors Q1706 (RED), Q1707 (GREEN), and Q1708 (BLUE). These RGB output transistors are therefore able to provide higher level RGB signals at their emitters. The signals go to the main board through connector E.

See ZVM-131 and ZVM-135 Circuit Boards for the description of other ZVM-133 and ZVM-136 circuit boards.

Servicing

Safety and Service Guidelines

WARNING: No work should be attempted on any part of the chassis by anyone not familiar with Zenith service procedures and precautions; otherwise, personal injury may result.

WARNING: With the monitor power turned off and disconnected, discharge the high voltage anode lead at the CRT using a jumper lead connected between the chassis and a screwdriver (see Figure 32). Failure to comply could result in severe shock and/or personal injury.

WARNING: Do not operate the monitor with excessive high voltage any longer than necessary or the monitor may produce X-rays from the CRT.

Excessive high voltage will produce X-rays from the CRT; always verify that the voltage is at normal levels when servicing the monitor.

WARNING: Carefully handle the cathode-ray tube when you hold, remove, or install it; otherwise, implosion and/or injury may result.

NOTE: Under no circumstances should the original design be modified or altered without permission from Zenith Electronics Corporation.

AC Leakage Test

To prevent electrical shock after reassembly, perform an AC leakage test on all exposed metal parts of the monitor. Do not use an isolation transformer to perform this test.

1. Connect the test circuit as shown in Figure 4.
2. With the monitor turned on, measure the leakage voltage between earth ground and an exposed monitor metal part.
3. Repeat the measurement with the meter leads reversed.
4. Repeat steps 2 and 3 until all exposed metal parts are verified to have satisfactory AC leakage levels.

WARNING: Any leakage voltage measurement that exceeds 0.75 volts rms (0.5 milliamperes AC) constitutes a potential shock hazard and must be corrected.

CAUTION: Some of the ICs (integrated circuits) used in the monitor are electrostatic-sensitive devices (ESD). These circuits can be damaged by static electricity. When handling any IC, use a wrist grounding strap or be sure to equalize the static charge before touching the IC.

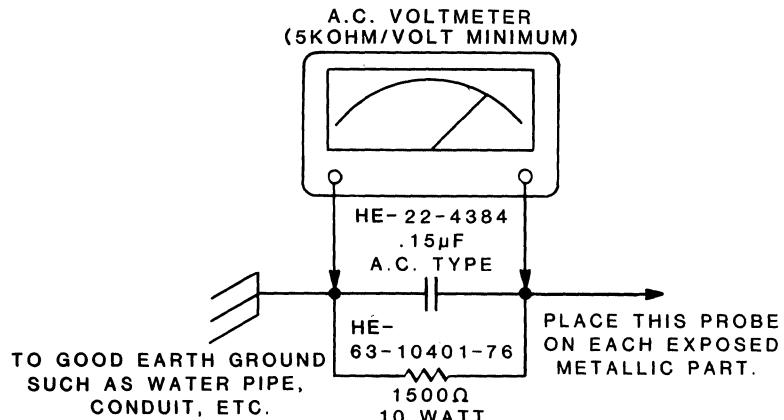


Figure 4
AC Leakage Voltmeter Circuit

Other Precautions

- Be sure that all components are positioned in such a manner as to avoid the possibility of short circuits.
- Inspect and correct all soldered connections for cold solder joints, frayed leads, damaged insulation, splashed solder, or sharp points.
- Never release a repaired product to a customer unless all protective devices, such as insulators, barriers, cover shields, strain reliefs, etc., have been installed.
- Remove all loose material from inside the monitor after servicing.
- Follow the original lead layout, dress, lengths, and tension.
- Replace all components with exact Zenith replacement parts.

Suggested Tools and Supplies

- 1/4-inch nut driver
- Flat-bladed screwdriver, 1/4-inch blade
- Phillips screwdriver, No. 1 tip
- Phillips screwdriver, No. 2 tip
- Diagonal cutters
- Wire strippers
- Long-nose pliers
- Desoldering tool
- Soldering iron, 25 to 40 watts
- Solder, 60/40, HE-331-59
- Desoldering braid, HE-490-185
- Cable ties, HE-354-59
- Lint-free cloths

Test Equipment

- Oscilloscope — DC to 100 MHz, dual trace, triggered sweep. Tektronics Model 465, or equivalent.
- Logic probe — Capable of detecting 10 nanoseconds single pulses, and indicating logic one, logic zero, and high impedance states. Heath Model IT-7410, or equivalent.

- Digital voltmeter — High impedance input, zero to 1000 volts, zero to one megohm. Heath Model SM-2215, or equivalent.
- Variable power supply — Zero to 120 VAC rms, 3 amps Heath Model IM-5210, or equivalent.
- Low capacitance oscilloscope probe — Input capacitance adjustable from 15 pF to 50 pF, 4 ns rise time. Heath Model PKW-105, or equivalent.
- High voltage probe — Zero to 40 kV. Heath Model IM-5210, or equivalent.
- Isolation transformer

Troubleshooting

Use the following inspection to determine possible causes of monitor failures.

- Verify proper computer operation.
- Check monitor controls for proper response and settings.
- Unplug the signal and power cables from the monitor and check for burnt insulation, broken wires, or loose prongs on plugs.
- Check the AC receptacle (wall outlet) for proper supply voltage.
- Check all cabling and internal circuit board plugs for proper electrical connections. Refer to the applicable block diagram and component location illustrations for cable connector assignments.
- Check monitor adjustments as explained at the end of this section.
- Check all circuit boards for broken or burnt components or for darkened areas or other signs of component overheating.
- Verify that the GREEN/WHITE switch is in the correct position.
- When power is applied, check the CRT for glowing filament.
- When power is applied, check for high voltage by placing the back of the hand near the face of the CRT.

Table 1
General Troubleshooting

PROBLEM	POSSIBLE CAUSE
Dead monitor	No power at source Power cord Fuse Connector 3R8 Connector 3S8 Power switch
No display	RGB cable 95 volt supply
No color	GREEN/WHITE switch Software produces monochrome display
Green color only	GREEN/WHITE switch Software produces green display
Out of focus	Focus control
Raster displayed	G2 control
Display does not fit on CRT	P1, P2 on the sweep board Width control 95 volt adjustment

Fault Isolation Procedures

Have the monitor sync-locked to a signal, if possible, before starting this procedure.

Always reference the DVM or oscilloscope to DC (cold) ground unless instructed otherwise.

A 10X probe is recommended for use with the oscilloscope.

1. With a DVM, measure the voltage at pin 2 of connector 3V3 on the main board (see Figure 16).

If +150 VDC is present, proceed to step 2.

If +150 VDC is not present, replace the main board.

2. With a DVM, measure the voltage at pin 2 of connector 3F3 on the main board.

If the voltage is from +4.5 VDC to +12 VDC, proceed to step 3.

If the voltage is less than +4.5 VDC, replace the main board.

3. With a DVM, measure the voltage at pin 2 of connector 3D3 on the main board.

If the voltage is from +12 VDC to +26 VDC, proceed to step 4.

If the voltage is more than +26 volts, replace the main board.

4. With a DVM, measure the voltage at pin 2 of connector 3G3 on the main board. A value of +0.3 VDC should be observed. Observe this point with an oscilloscope and verify the presence of horizontal drive pulses.

If the pulses are present, proceed to step 5.

If the pulses are not present, replace the main board.

5. With an oscilloscope, measure the supply voltages at connector 3D3 on the main board. The voltages should be:

Pin 1 170 volts peak to peak

Pin 2 +26 volts DC

Pin 3 Ground

Pin 5 60 volts peak to peak

Pin 6 140 volts peak to peak

If all voltages are correct, proceed to step 6.

If any voltage is not correct, replace the sweep assembly.

6. Use a high voltage probe to verify the presence of 26 kV on the CRT anode lead.

If +26 kV is present, proceed to step 7.

If +26 kV is not present, replace the sweep assembly.

7. Apply a white field on the entire CRT. This can be done with a video source or, with a Z-100 or Z-100 PC computer, by using the Z-BASIC or GW-BASIC command:

PAINT(0,0),,7

Disconnect 5A2 connector from the video output board and measure for the following voltages at the cable connector:

Pin 2 (BLUE)	+3.5 VDC to +4.5 VDC
Pin 3 (GREEN)	+3.5 VDC to +4.5 VDC
Pin 4 (RED)	+3.5 VDC to +4.5 VDC

If the voltages are within range, proceed to step 8. If any voltage is not within range, replace the main board.

8. Refer to Alignments and Adjustments in this section to be sure that all alignments and adjustments have been made.
9. If the monitor still has a problem, the CRT or video output board may be defective.

Alignments and Adjustments

Instructions for the alignment and adjustment of the main board, the sweep assembly boards, and the audio/video sync board are provided in the following text.

MAIN BOARD ADJUSTMENTS

RGB Cutoff and G2 Adjustments

These adjustments should be made in a darkened room.

1. Turn each control (R2506-RED, R2516-GREEN, and R2527-BLUE) fully counterclockwise (see Figure 5).
2. Adjust G2 on the sweep board (see Figure 6) until the raster just appears.
3. Adjust each cutoff control until a gray raster appears.
4. Readjust G2 until the raster just disappears.

RGB Drive Adjustments

Apply a white field on the entire CRT. This can be with a video source or, with a Z-100 or Z-100 PC computer, by using the Z-BASIC or GW-BASIC command:

PAINT(0,0),,7

Observe the screen closely and see if any red, green, or blue tints are present. Adjust the appropriate drive (R2506-RED, R2517-GREEN, R2528-BLUE) until the tint disappears.

Vertical Center and Vertical Height Adjustments

These controls (R3418-height and R2125-vertical centering) should be adjusted under low-light conditions.

1. Turn the G2 control clockwise until a raster appears.
2. Adjust these two controls so that the top and bottom of the raster are 1/2-inch from these edges of the CRT.
3. Turn the G2 control counterclockwise until the raster just disappears.

Horizontal Center and Width Adjustments

Horizontal centering control R3441 (located on the main board) and horizontal width LX3261 (located on the sweep board) should be adjusted under low-light conditions. (See Figure 6).

NOTE: Width selection must be made before attempting these adjustments.

1. Turn the G2 control (located on the sweep board) clockwise until a raster appears.
2. Adjust these two controls so that the raster is 1/4-inch from the left and 3/8-inch from the right CRT edges.
3. Turn the G2 control counterclockwise until the raster just disappears.

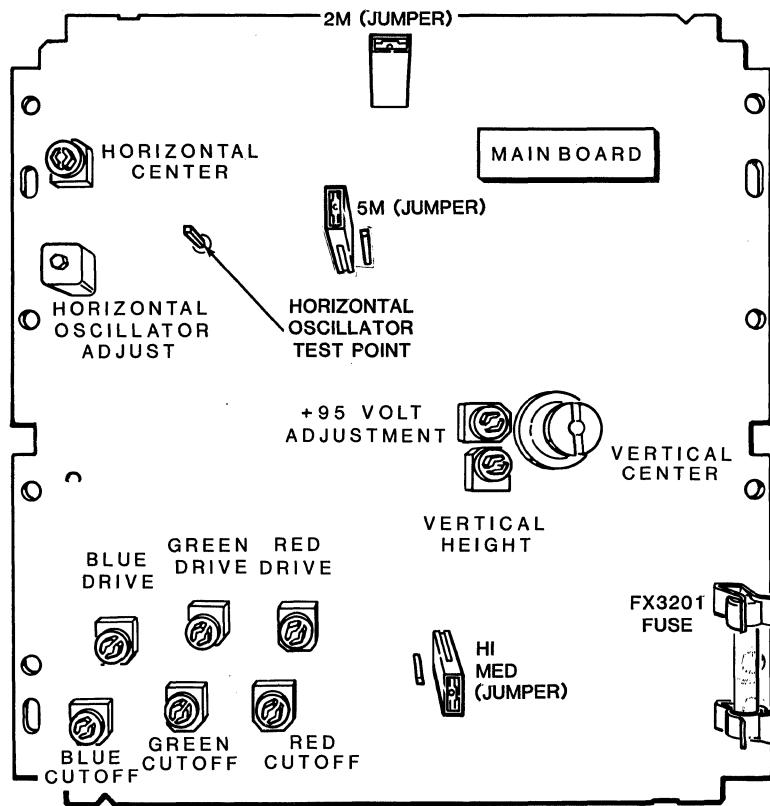


Figure 5
Main Board Adjustments

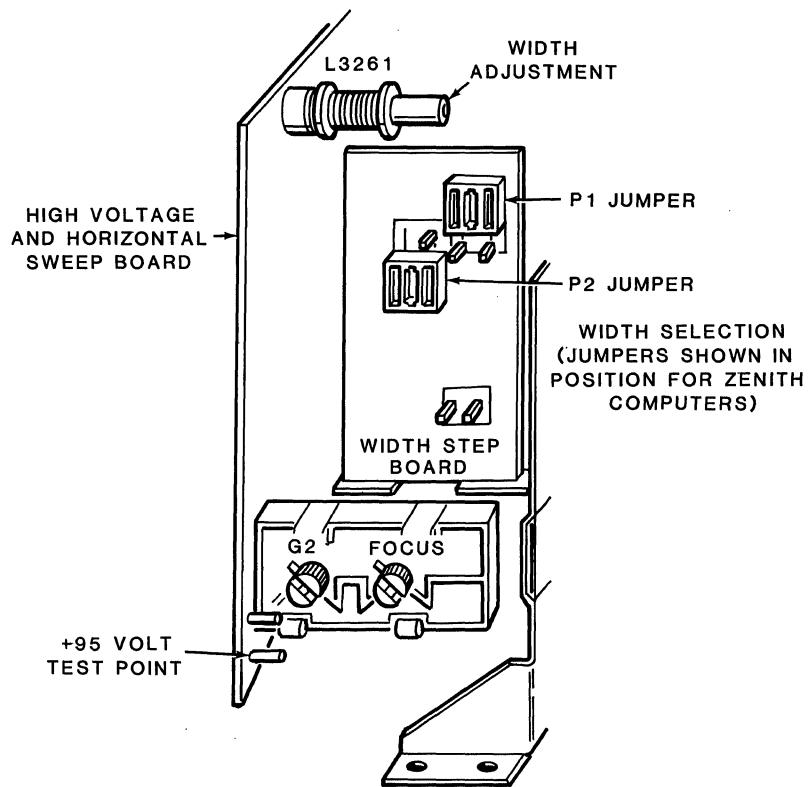


Figure 6
High Voltage and Sweep Board/Width
Step Board Adjustments

Horizontal Oscillator Adjustment

The horizontal oscillator control L3402 (located on the main board) is for oscillator frequency adjustment.

1. Disable the automatic phase control (APC) by jumpering +12 VDC to pin 27 of the sync processor IC3401.
2. Adjust L3402 for an oscillator frequency of 15,734 Hz.
3. Remove the jumper from +12 VDC and pin 27 of IC3401.

+95 Volt Adjustment

The +95 volt (B+) adjustment is located on the main board. The test point is located on the sweep board (see Figures 5 and 6).

1. Connect the monitor to the AC line through an isolation transformer.
2. Connect the ground lead of the voltmeter to the hot AC ground.
3. Connect the hot lead of the voltmeter to the +95 volt test point.
4. Adjust the 95-volt control for 95 volts.

SWEEP ASSEMBLY ADJUSTMENTS

Focus Adjustment

With a video source connected to the monitor, adjust the focus control (see Figures 2, 3, and 6 located on the sweep board) for the clearest (sharpest) display.

Width Selection

NOTE: This selection must be made before attempting width adjustment.

Coarse width is controlled with jumpers P1 and P2. For Zenith computers, P1 should be in the upper-vertical position and P2 should be in the lower-vertical position.

With P1 and P2 in the lower-vertical position, the width of the display is much wider than can be used on a Zenith computer.

With P1 in the lower-vertical position and P2 in the upper-vertical position, the display is narrower and will not fill the screen when used on a Zenith computer.

AUDIO/VIDEO SYNC BOARD ADJUSTMENTS

Chroma Null Phase Adjustment

This adjustment requires the display of a color bar pattern. (See the Color Bar Test in this section under Performance Tests.)

1. Put a color bar pattern on the screen.
2. Remove the A1 jumper from the board and reinstall it 90 degrees clockwise or counterclockwise from its original (operation) position.
3. Adjust the chroma null phase adjustment control R2390 until the colors stabilize.
4. Replace A1 jumper on the board in the original (operation) orientation.

BLUE and RED Cutoff Adjustments

These adjustments are similar to the cutoff adjustments on the main board.

1. Turn each cutoff control (R1708 RED and R1714 BLUE) fully counterclockwise.
2. Adjust G2 on the sweep board, until a raster just appears.
3. Readjust each cutoff until the raster appears gray in color.
4. Adjust G2 until the raster just disappears.

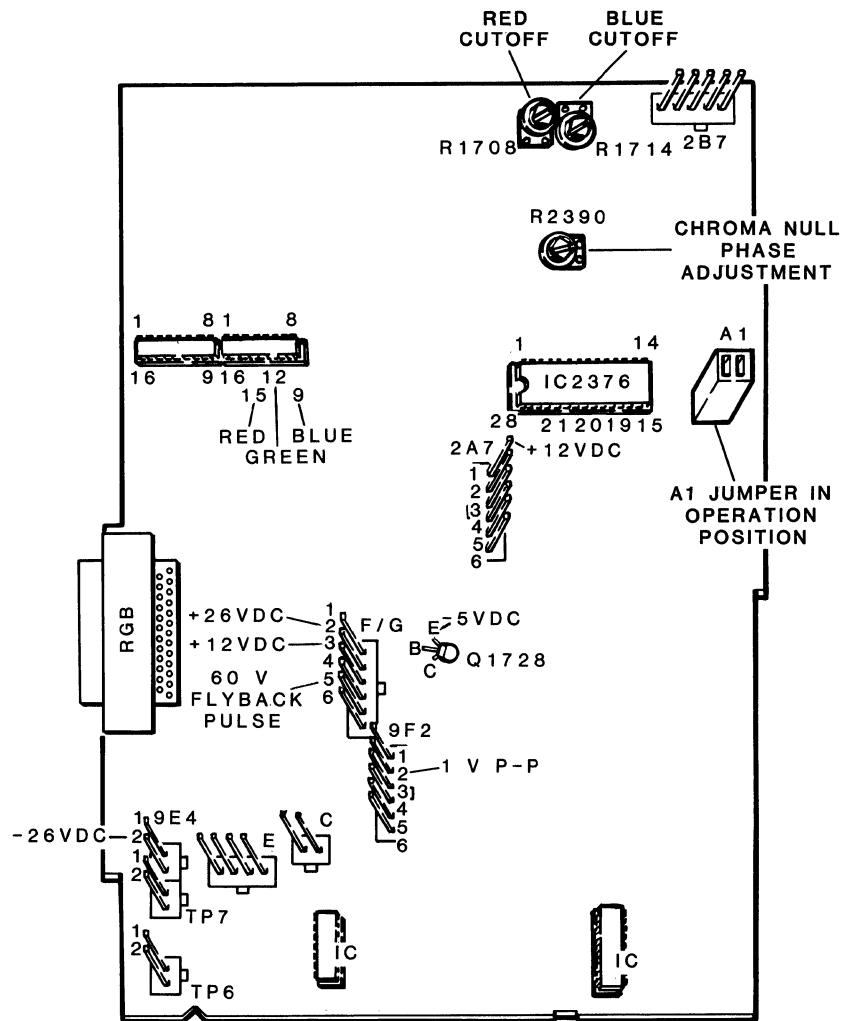


Figure 7
Audio/Video Sync Board Adjustments

Cleaning Procedure

WARNING: Be sure that the monitor's power cable is unplugged before cleaning.

- Clean the cabinet with a lint-free cloth, lightly dampened and with a mild cleaning solution; do not spray liquids directly on the monitor or use a wet, saturated cloth.
- Clean the monitor's screen with a good quality glass cleaner.
- Be sure that the monitor is completely dry before applying electrical power.

3. Select the Keyboard Test by pressing the **2** key.
4. Choose any character to fill the screen by pressing it. The capital Z is recommended.
5. Check to see if the screen is filled with the test character and if the width and height of the display are correct.
6. Make any necessary adjustments (see Alignments and Adjustments in this section).
7. When you are finished using the display, press the **DELETE** key to return to the test menu.
8. Press the **5** key to return to the hand prompt.

Performance Tests

A Zenith Z-100, Z-100 PC, or equivalent computer is required for these tests.

FILL THE SCREEN TEST

The screen can be filled by using the Monitor ROM.

1. Turn on the computer.
2. Z-100: When the hand prompt appears (you may have to defeat the autoboot by pressing the **ESC** key during the autoboot sequence to get this), press the **T** key to obtain the test menu from the monitor ROM. If the test menu does not appear and the computer beeps, then the monitor ROM is an early version and does not contain the test routines. In this situation, use the BASIC program.
Z-100 PC: Press the **CTRL**, **ALT**, and **INS** keys and then enter "TEST" and press **RETURN**.

Use the color bar to determine if any of the color adjustments have to be made. (See Alignments and Adjustments in this section.)

1. Turn on the computer.
2. Z-100: When the hand prompt appears, press **C** to obtain the color bar pattern. If the color bar pattern does not appear, then the monitor ROM is an early version and the BASIC program in Listing 1 will have to be used.

NOTE: The autoboot may have to be defeated by pressing the **ESC** key during the autoboot sequence to get the color bar pattern.

Z-100 PC: Press the **CTRL**, **ALT**, and **INS** keys simultaneously. Press the **C** key and then the **RETURN** key.

3. The hand prompt will continue to be seen at the bottom of the color bar.
4. When the necessary adjustments have been made, press the DELETE key to return to the test menu.

BASIC PROGRAM

The program in Listing 1 can be used to produce a color bar pattern on a Z-100 with the color option.

1. Turn on the computer.
2. Boot Z-DOS and start Z-BASIC.
3. Enter and run the BASIC program in Listing 1.

Listing 1. BASIC Color Bar Program

```

10 REM clear screen
20 CLS
30 REM produce color bar
40 LINE(0,0)-(79,106),0,BF
50 LINE(80,0)-(159,106),1,BF
60 LINE(160,0)-(239,106),4,BF
70 LINE(240,0)-(319,106),5,BF
80 LINE(320,0)-(399,106),2,BF
90 LINE(400,0)-(479,106),3,BF
100 LINE(480,0)-(559,106),6,BF
110 LINE(560,0)-(639,106),7,BF
120 REM label bars
130 LOCATE 13,5
140 PRINT TAB(5);“BLACK”;
TAB(15);“BLUE”;TAB(25);“RED”;
150 PRINT TAB(35);“MAGENTA”;
TAB(45);“GREEN”;TAB(55);“CYAN”;
160 PRINT TAB(65);“YELLOW”;TAB(75);“WHITE”
170 REM end of program
180 END

```

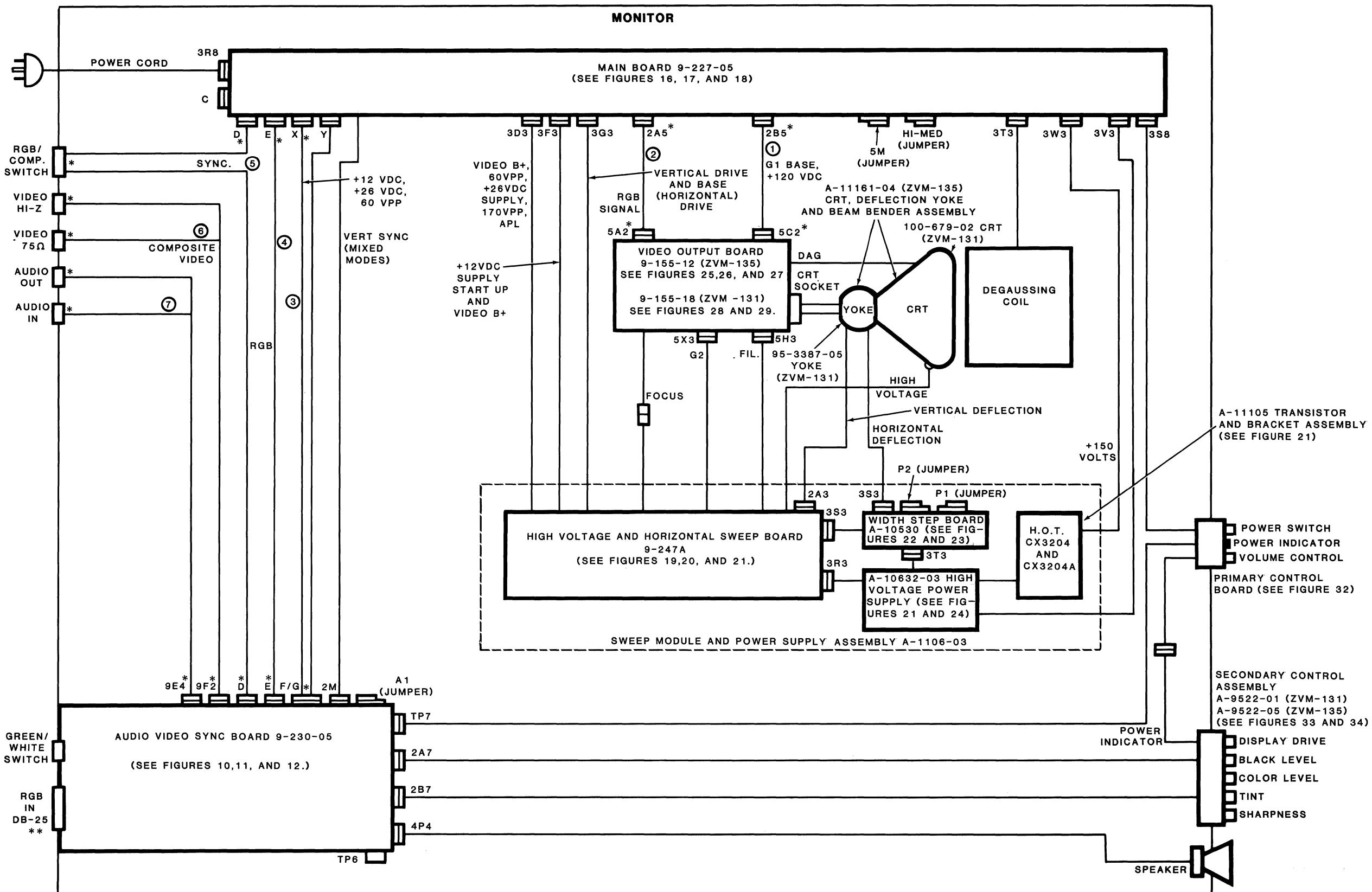
Servicing Diagrams

Use the following block diagrams to locate schematics while tracing signal and power circuits during troubleshooting.

Waveform representations are provided with adjacent schematic and component location drawings. The source location of waveforms are shown on both schematic and component location drawing.

A Zenith Z-160 computer was used to supply the RGB and composite signals for generating the waveforms.

NOTE: Some of the input and output waveforms that are shown were taken from the adjacent boards because monitor points were more accessible there. Therefore, look for input and output waveforms for the interfacing boards of the board being troubleshoot.



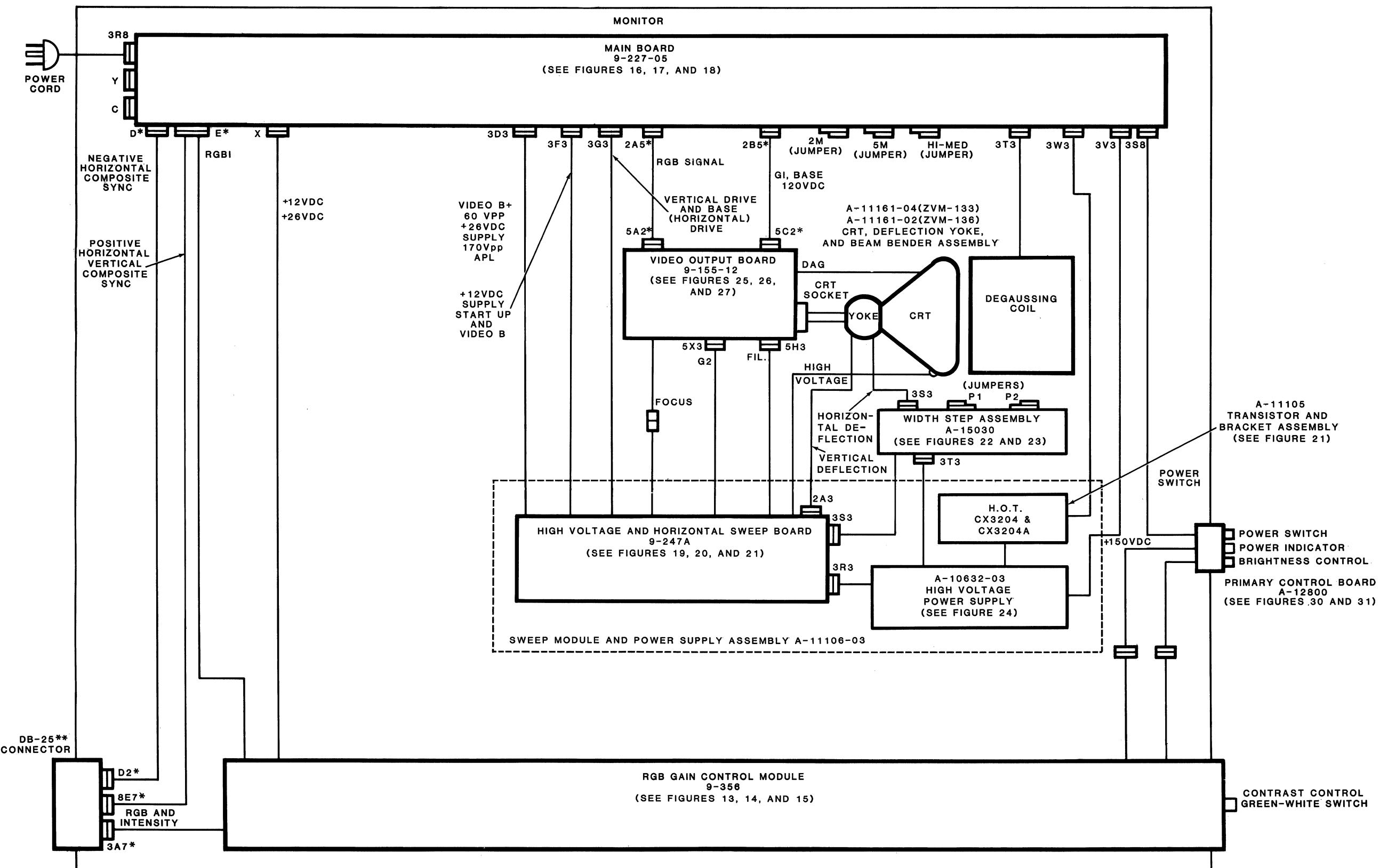
*CABLE PIN ASSIGNMENTS			
CABLE	CONNECTOR	TO	CONNECTOR
#1	2B5 (MAIN BOARD)	5C2 (VIDEO OUTPUT BOARD)	
	1	5	
	2	4	
	3	3	
	4	2	
	5	1	
#2	2A5 (MAIN BOARD)	5A2 VIDEO OUTPUT BOARD	
	1	4	
	2	3	
	3	2	
	4	1	
#3	F/G (AUDIO/VIDEO SYNC BOARD)	X (MAIN BOARD)	
	1	3	
	2	2	
	3	1	
	4	Y (MAIN BOARD)	
	5	3	
	6	2	
	7	1	
#4	E (AUDIO/VIDEO SYNC BOARD)	E (MAIN BOARD)	
	1	6	
	2	5	
	3	4	
	4	3	
#5	D (AUDIO/VIDEO SYNC BOARD)	D (MAIN BOARD)	
	COMP	4	
		1	
		2	
		3	
	RGB	2	
		5	
		6	
#6	VIDEO HI Z (INPUT PANEL)	VIDEO 75ohm (INPUT PANEL)	9F2 (AUDIO/VIDEO SYNC BD.)
	CENTER PIN	CENTER PIN	PIN 1
#7	AUDIO IN (INPUT PANEL)	AUDIO OUT (INPUT PANEL)	9E4 (AUDIO/VIDEO SYNC BD.)
	CENTER PIN	CENTER PIN	PIN 1

** DB-25 RGB IN CONNECTOR PIN ASSIGNMENTS

- 1 NEGATIVE HORIZONTAL OR NEGATIVE COMPOSITE SYNC¹
- 2 POSITIVE HORIZONTAL OR POSITIVE COMPOSITE SYNC¹
- 3 NC (RESERVED FOR MIXED MODE)
- 4 POSITIVE VERTICAL OR POSITIVE COMPOSITE SYNC
- 5 GREEN INPUT
- 6 BLUE INPUT
- 7 RED INPUT
- 8 NC (RESERVED FOR VERTICAL HEIGHT SELECT)
- 9 NC (RESERVED)
- 10 GREEN FEEDTHROUGH
- 11 APPLE X1 INPUT
- 12 APPLE X2 INPUT
- 13 APPLE X3 INPUT
- 14 NEGATIVE VERTICAL OR NEGATIVE COMPOSITE SYNC
- 15 IBM INTENSITY
- 16 GROUND
- 17 NC
- 18 AUDIO INPUT
- 19 GROUND
- 20 COMPOSITE VIDEO INPUT
- 21 RED FEEDTHROUGH
- 22 BLUE FEEDTHROUGH
- 23 NC
- 24 NC
- 25 APPLE X8 INPUT

¹NOTE: Composite sync must be supplied to both the horizontal and vertical sync inputs.

Figure 8
Block Diagram ZVM-131 and ZVM-135



*CABLE PIN ASSIGNMENTS

D25	8A7	8E7	E	D2	D
1			1		
2		1	1	2	
3		2			
4					
5		5			
6		4			
7		3			
8					
9					
10					
11					
12					
13					
14			2	2	
15		1			
16		2			
17					
18					
19					
20					
21					
22					
23					
24					
25					
	2A5	5A2	2B5	5C2	
	1	4	1	5	
	2	3	2	4	
	3	2	3	3	
	4	1	4	2	
	5	1	5	1	

** DB-25 RGB INPUT CONNECTOR
PIN ASSIGNMENTS

1	NEGATIVE HORIZONTAL OR NEGATIVE COMPOSITE SYNC ¹
2	POSITIVE HORIZONTAL OR POSITIVE COMPOSITE SYNC ¹
3	NC (RESERVED FOR MIXED MODE)
4	POSITIVE VERTICAL OR POSITIVE COMPOSITE SYNC
5	GREEN INPUT
6	BLUE INPUT
7	RED INPUT
8	NC (RESERVED FOR VERTICAL HEIGHT SELECT)
9	NC (RESERVED)
10	GREEN FEEDTHROUGH
11	APPLE X1 INPUT
12	APPLE X2 INPUT
13	APPLE X3 INPUT
14	NEGATIVE VERTICAL OR NEGATIVE COMPOSITE SYNC
15	IBM INTENSITY
16	GROUND
17	NC
18	AUDIO INPUT
19	GROUND
20	COMPOSITE VIDEO INPUT
21	RED FEEDTHROUGH
22	BLUE FEEDTHROUGH
23	NC
24	NC
25	APPLE X8 INPUT

¹NOTE: COMPOSITE SYNC MUST BE SUPPLIED TO BOTH THE HORIZONTAL AND VERTICAL SYNC INPUTS.

Figure 9
Block Diagram ZVM-133 and ZVM-136

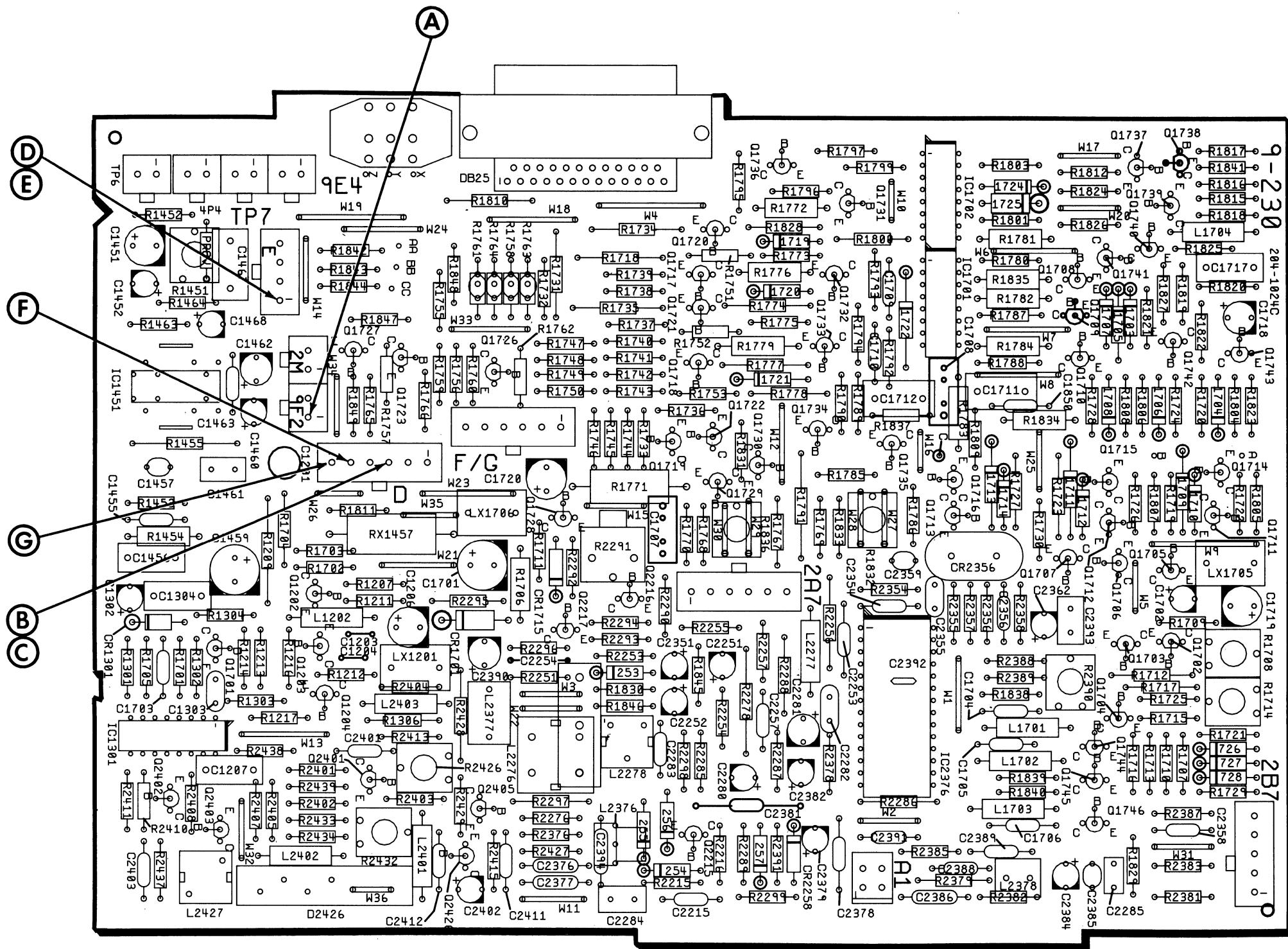


Figure 10
Audio/Video Sync Board Component Location

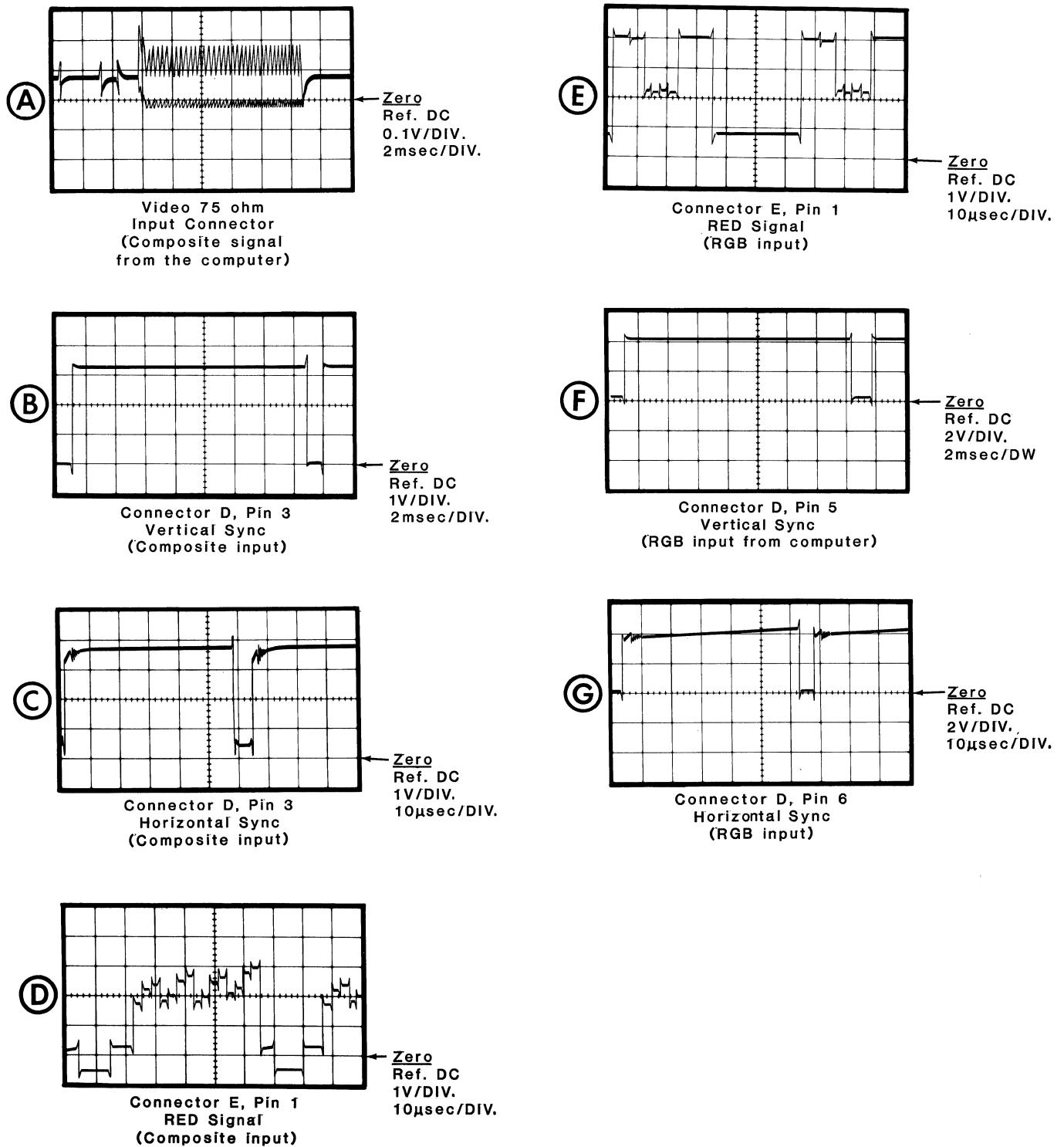


Figure 11
Audio/Video Sync Board Waveforms

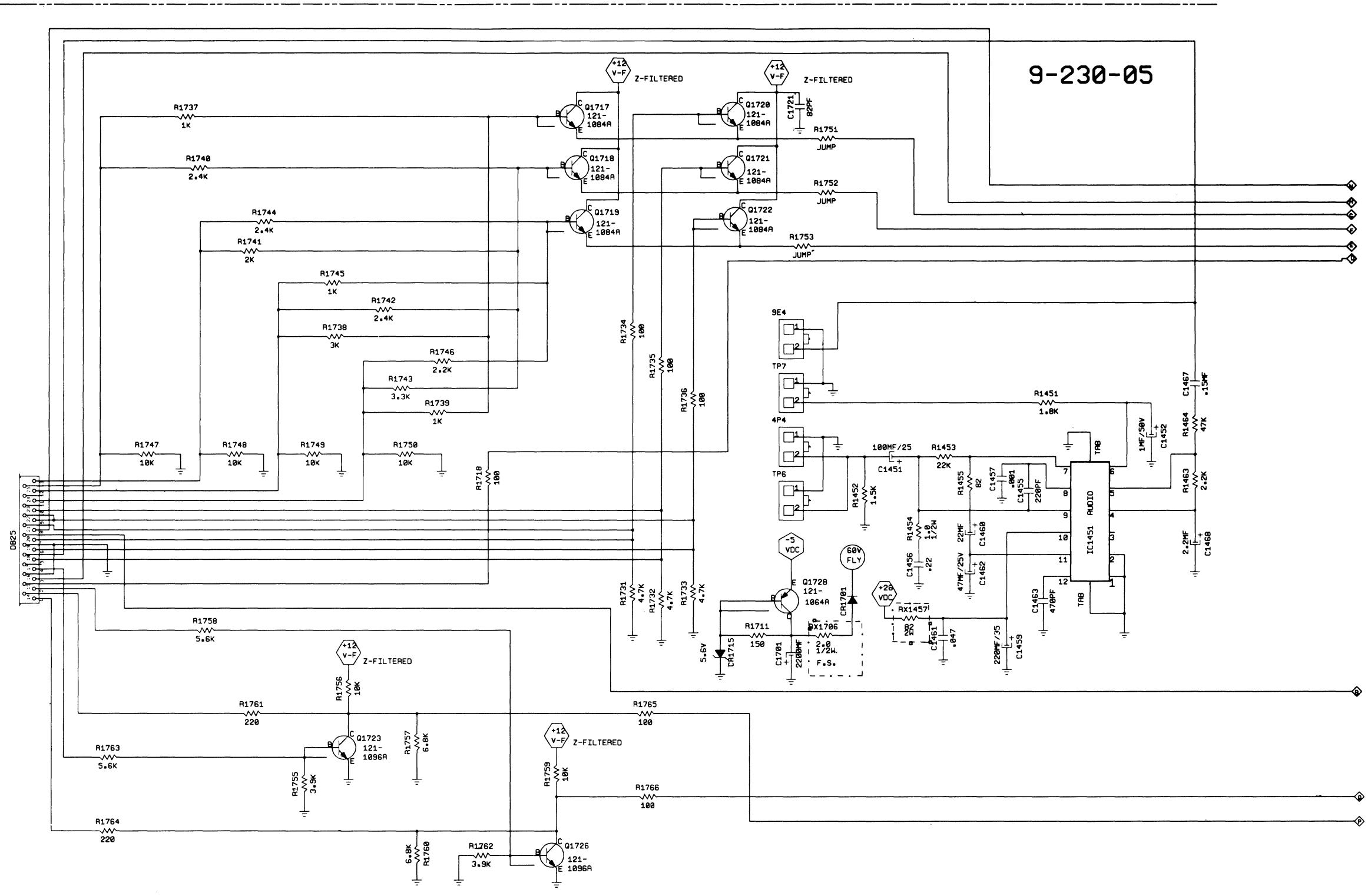


Figure 12
Part 1 of 3

NOTES:

1. RESISTORS ARE 1/4 WATT, 5 PERCENT TOLERANCE UNLESS OTHERWISE SPECIFIED.
2. CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

NOTES: (VALUE TAGS WITH SPECIAL MEANINGS)

- A. P/L = SEE PARTS LIST FOR APPLICABLE USAGE.
- B. JUMPER = JUMPER WIRE USED INSTEAD OF NORMAL PART
- C. PROV = PROVISION FOR A PHYSICAL PART
IN THE LAYOUT ONLY.

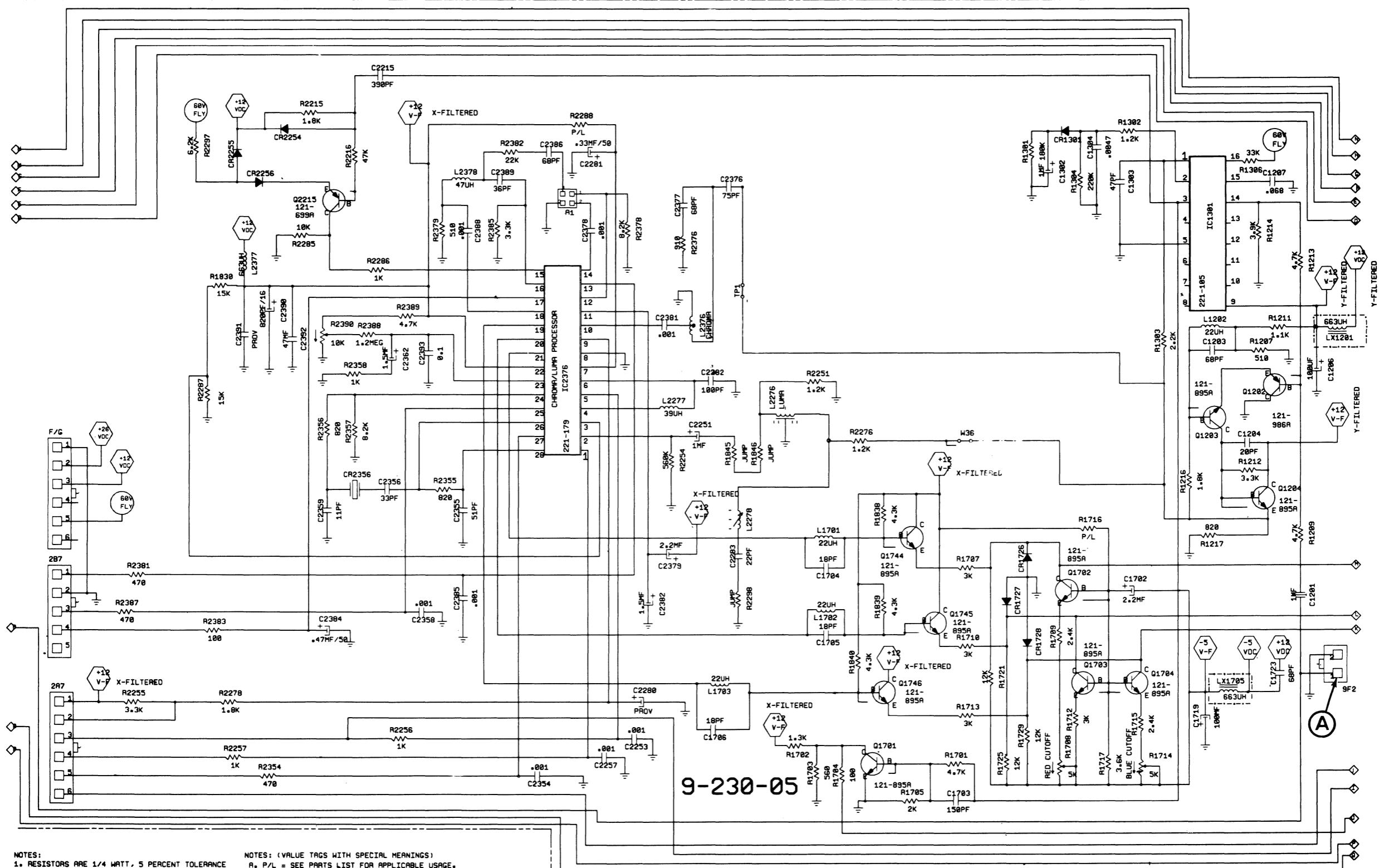
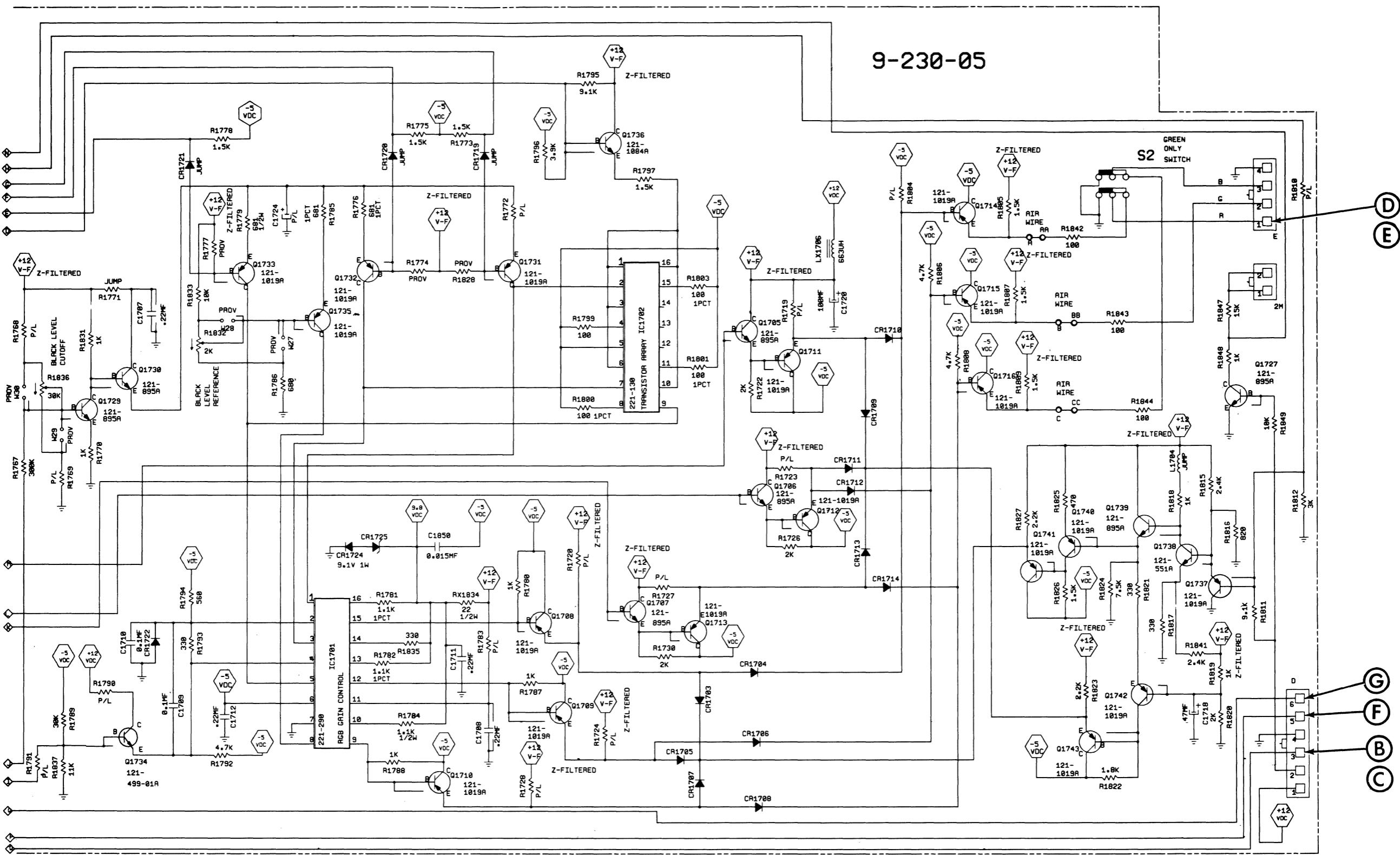


Figure 12
Part 2 of 3



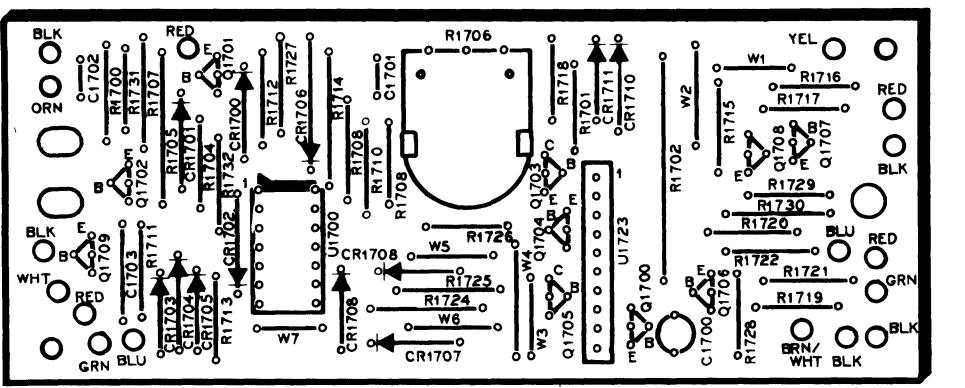


Figure 13
RGB Gain Control Board Component Location

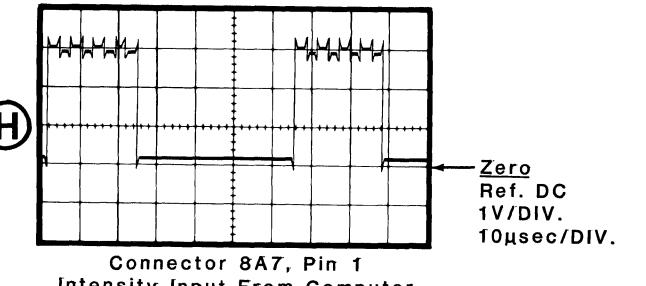


Figure 14
RGB Gain Control Board Waveforms

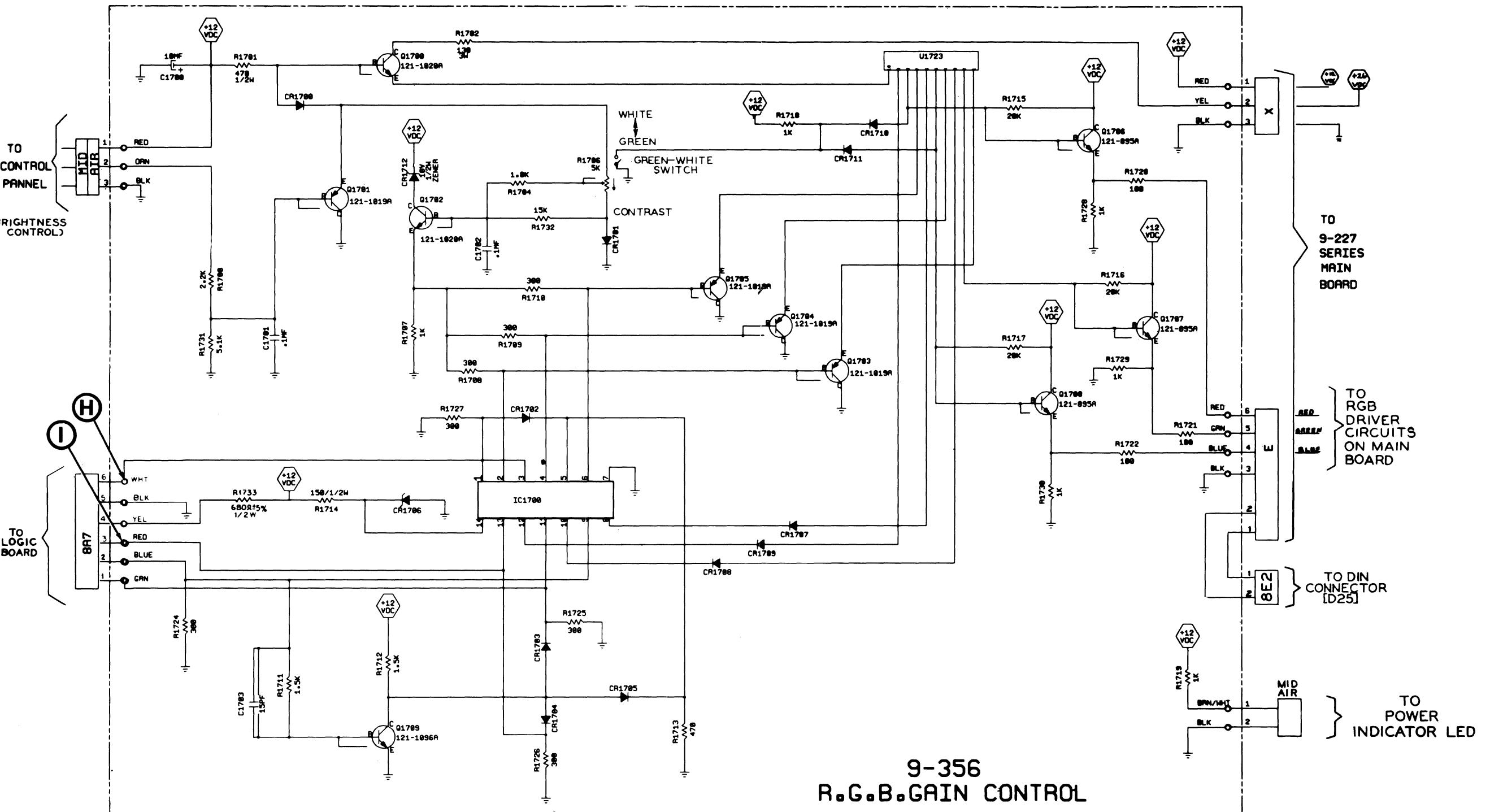


Figure 15
RGB Gain Control Board Schematic

NOTES:
1. RESISTORS ARE 1/4 WATT, 5 PERCENT TOLERANCE
UNLESS OTHERWISE SPECIFIED.
2. CAPACITORS ARE IN MICROFARADS UNLESS
OTHERWISE SPECIFIED.
R = P/L = SEE PARTS LIST FOR APPLICABLE USAGE.
J = JUMPER = JUMPER WIRE USED INSTEAD OF NORMAL PART
C = PROV = PROVISION FOR A PHYSICAL PART
IN THE LAYOUT ONLY.

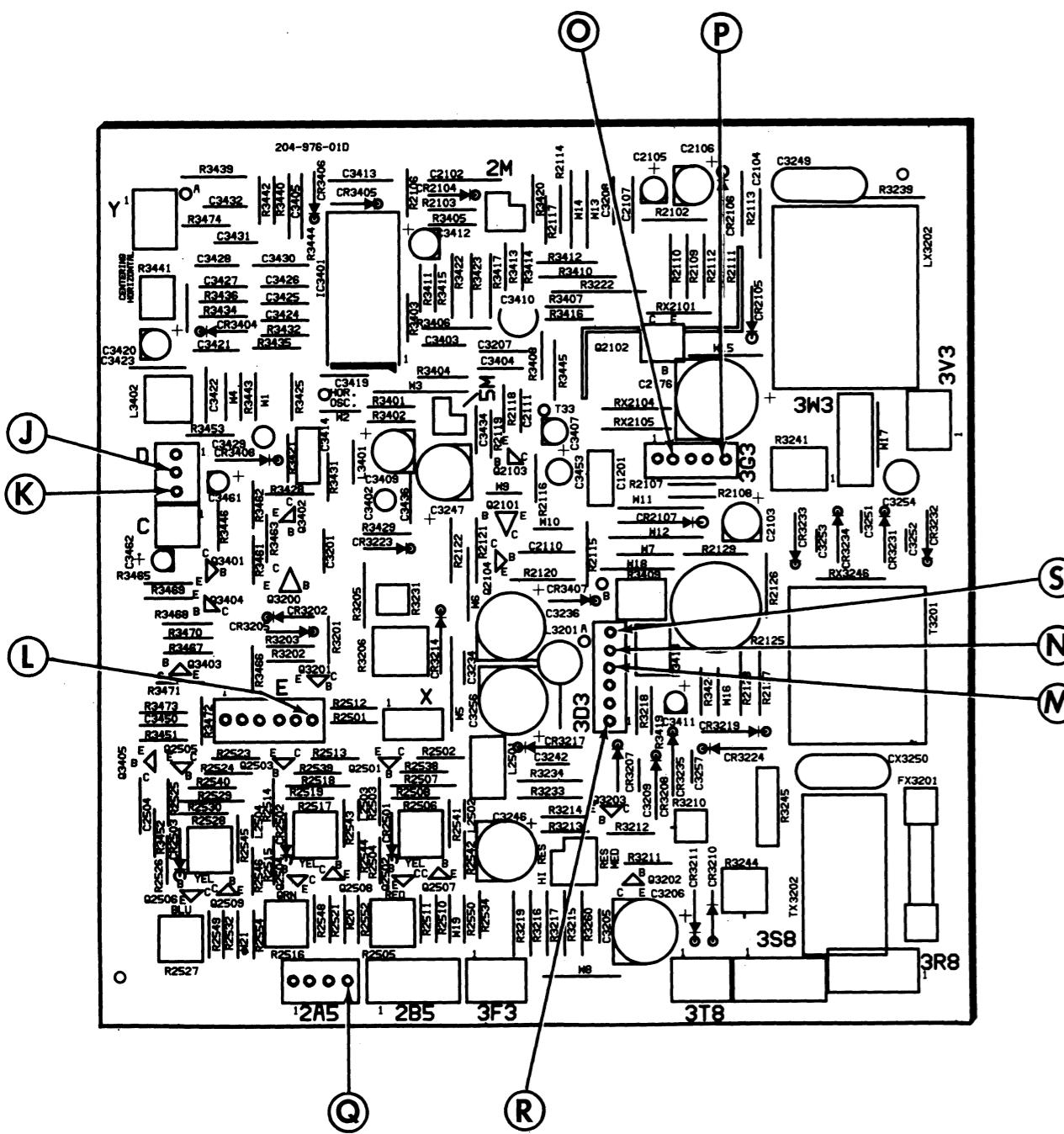


Figure 16
Main Board Component Location

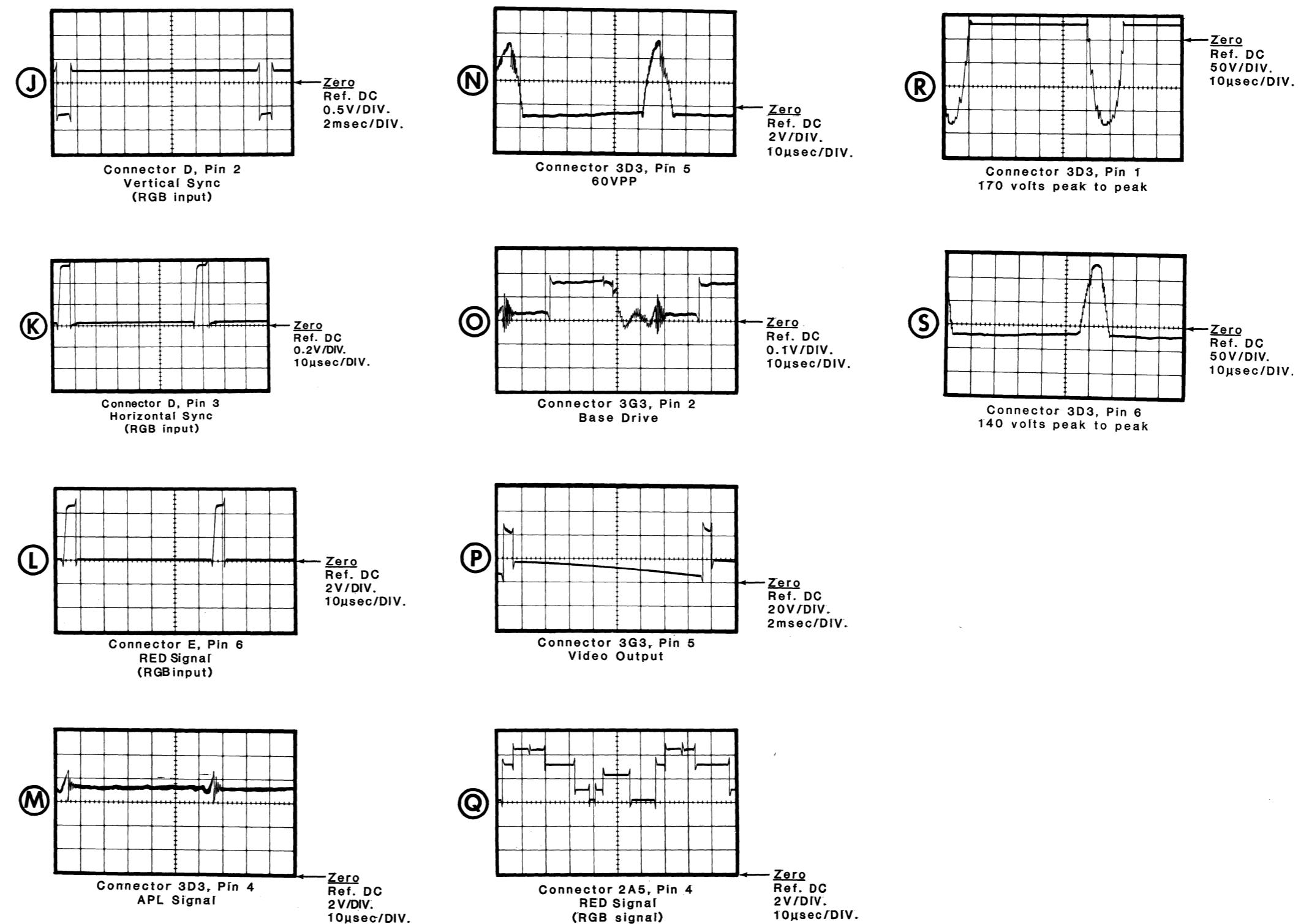


Figure 17
Main Board Waveforms

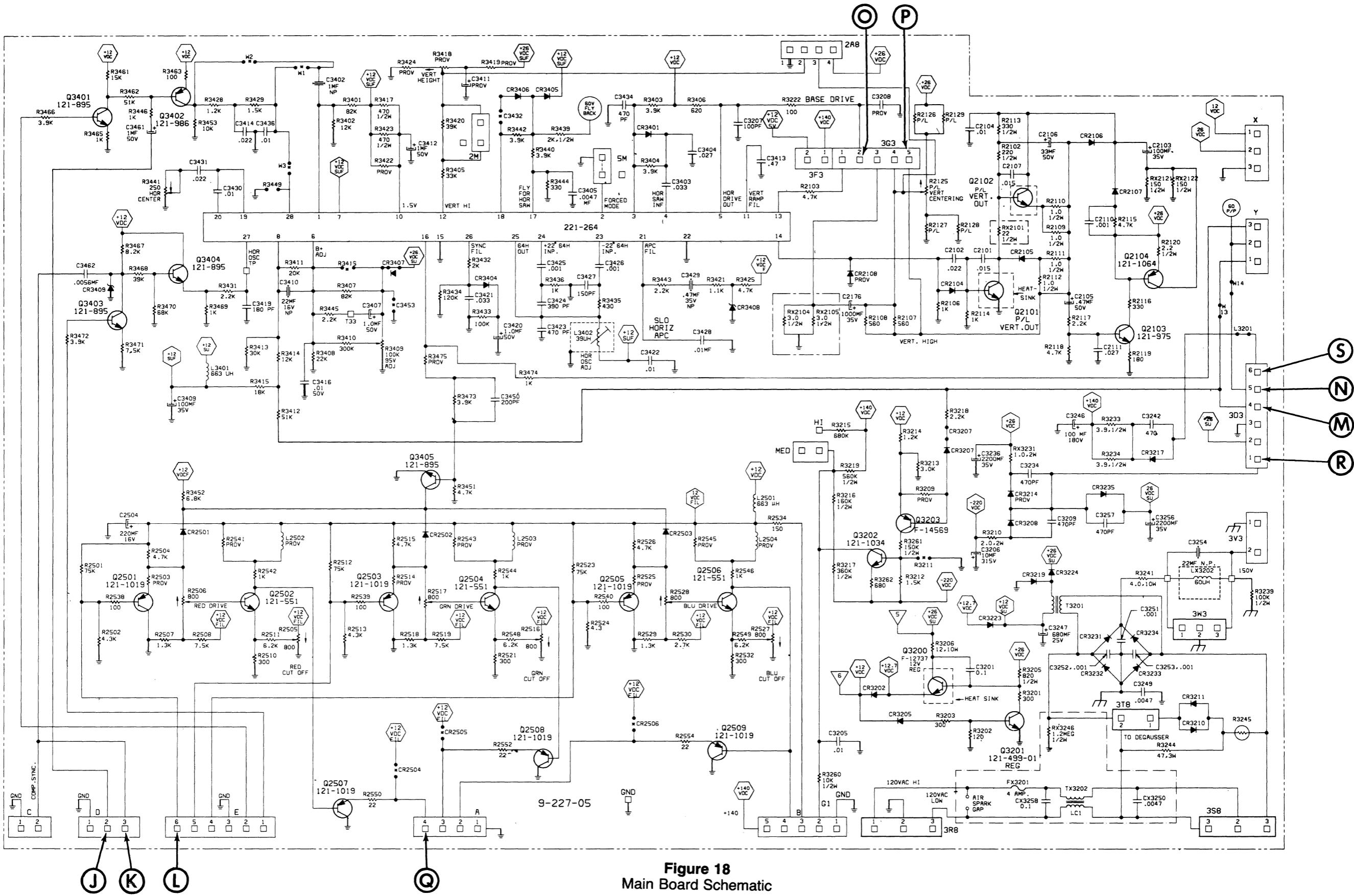
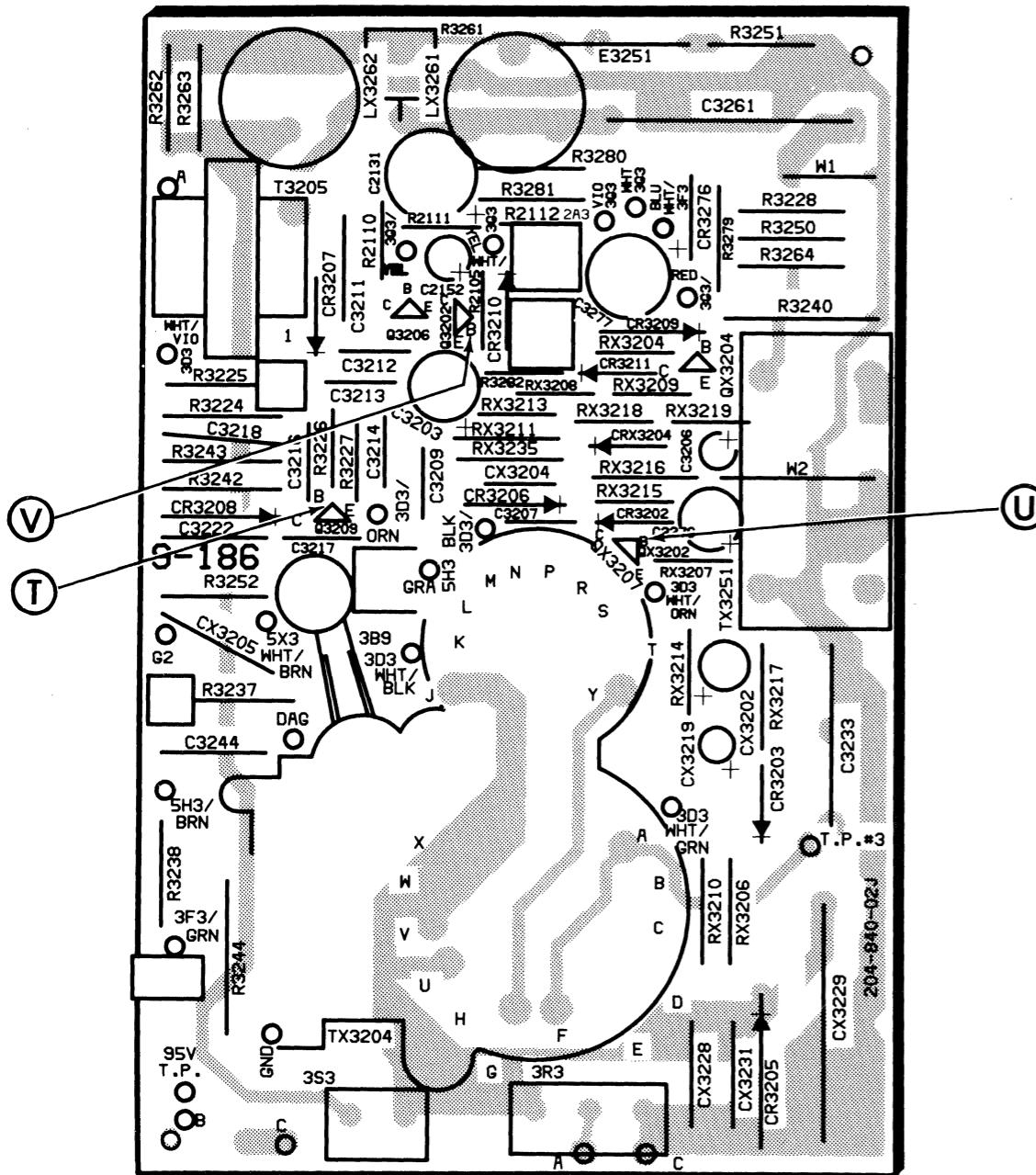


Figure 18
Main Board Schematic



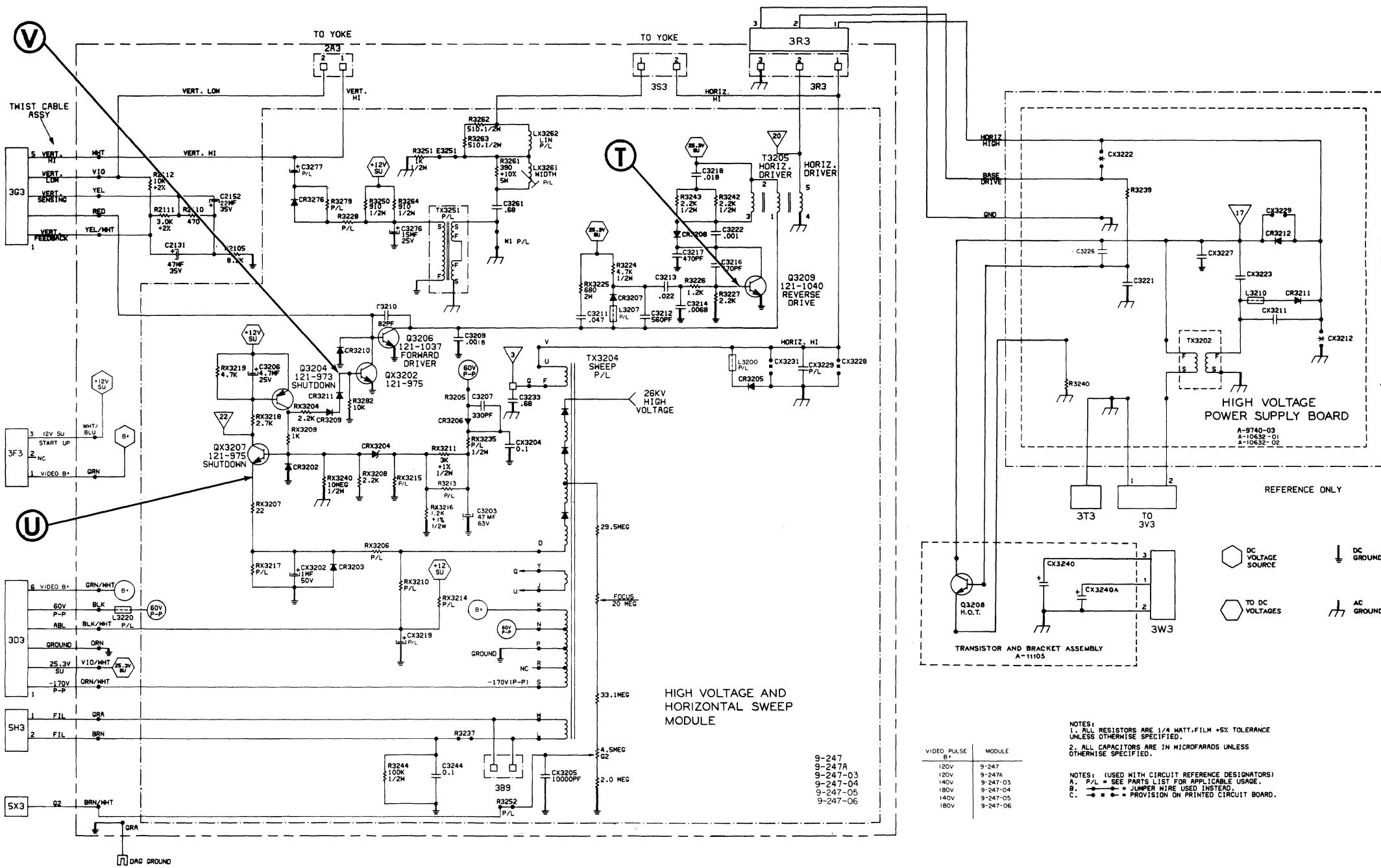


Figure 21
High Voltage and Horizontal Sweep Board
Schematic

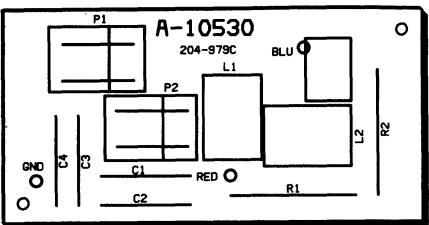


Figure 22
Width Step Board Component Location

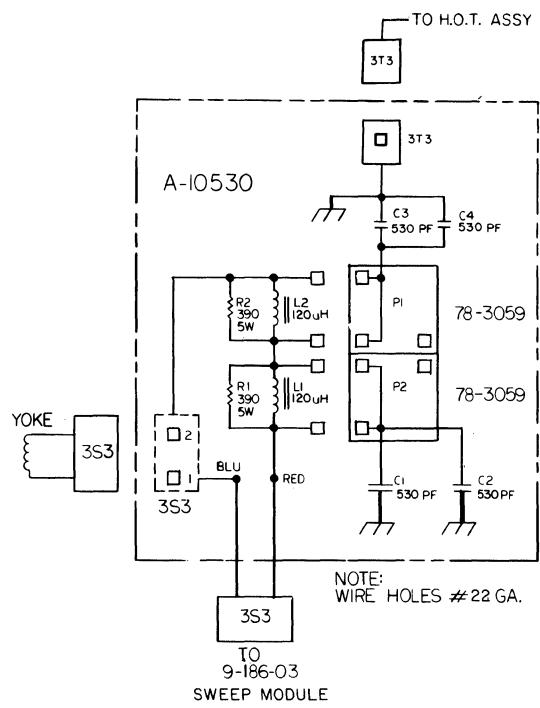


Figure 23
Width Step Board Schematic

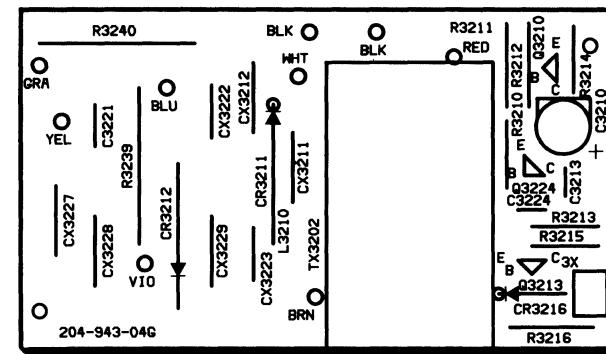


Figure 24
High Voltage Power Supply Component Location

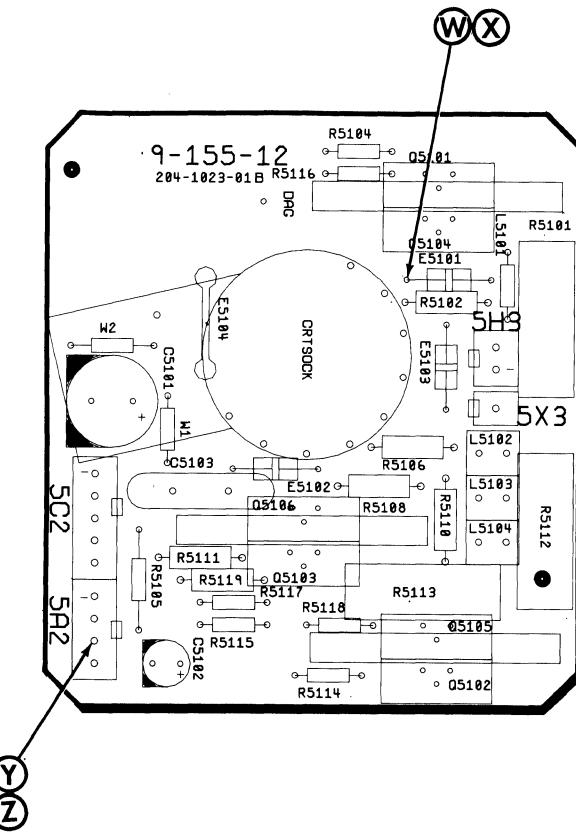


Figure 25
Video Output Board (High-Resolution)
Component Location

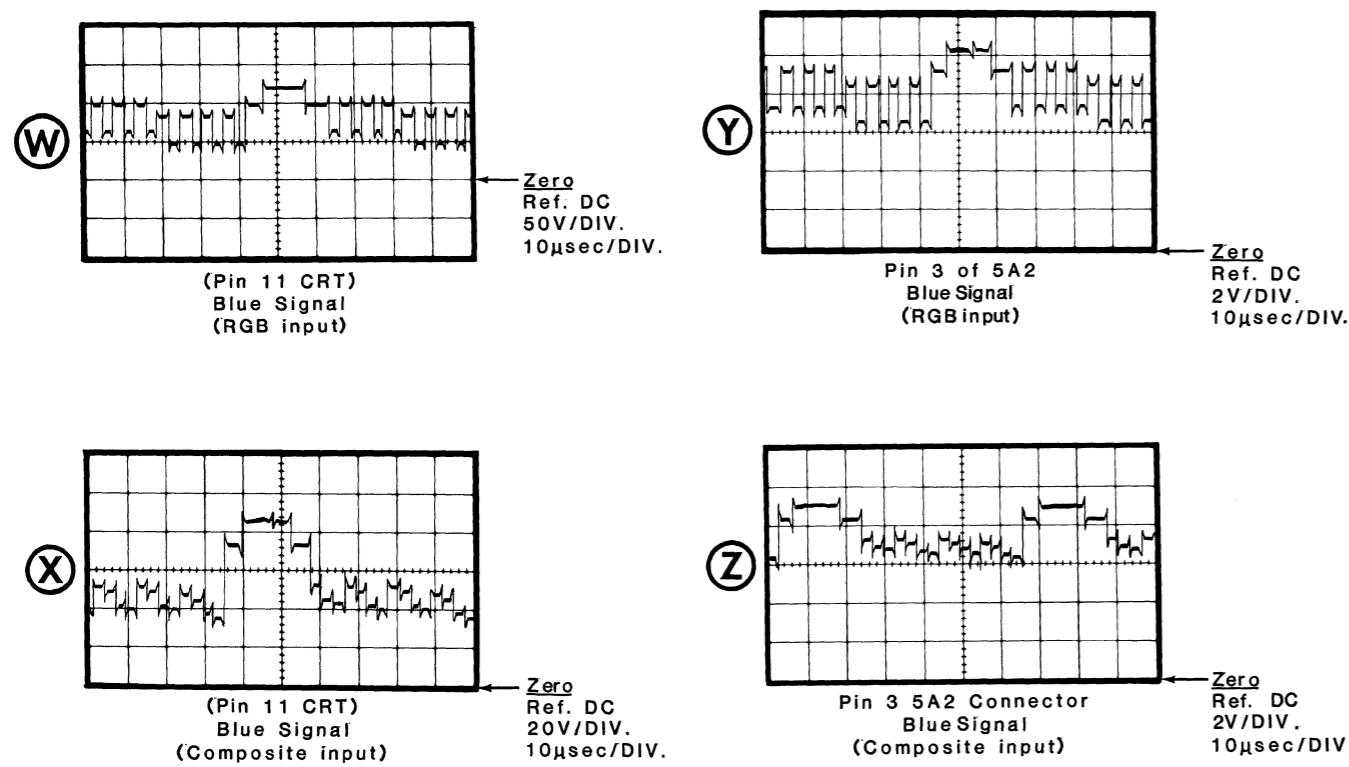


Figure 26
Video Output Board (High-Resolution)
Waveforms

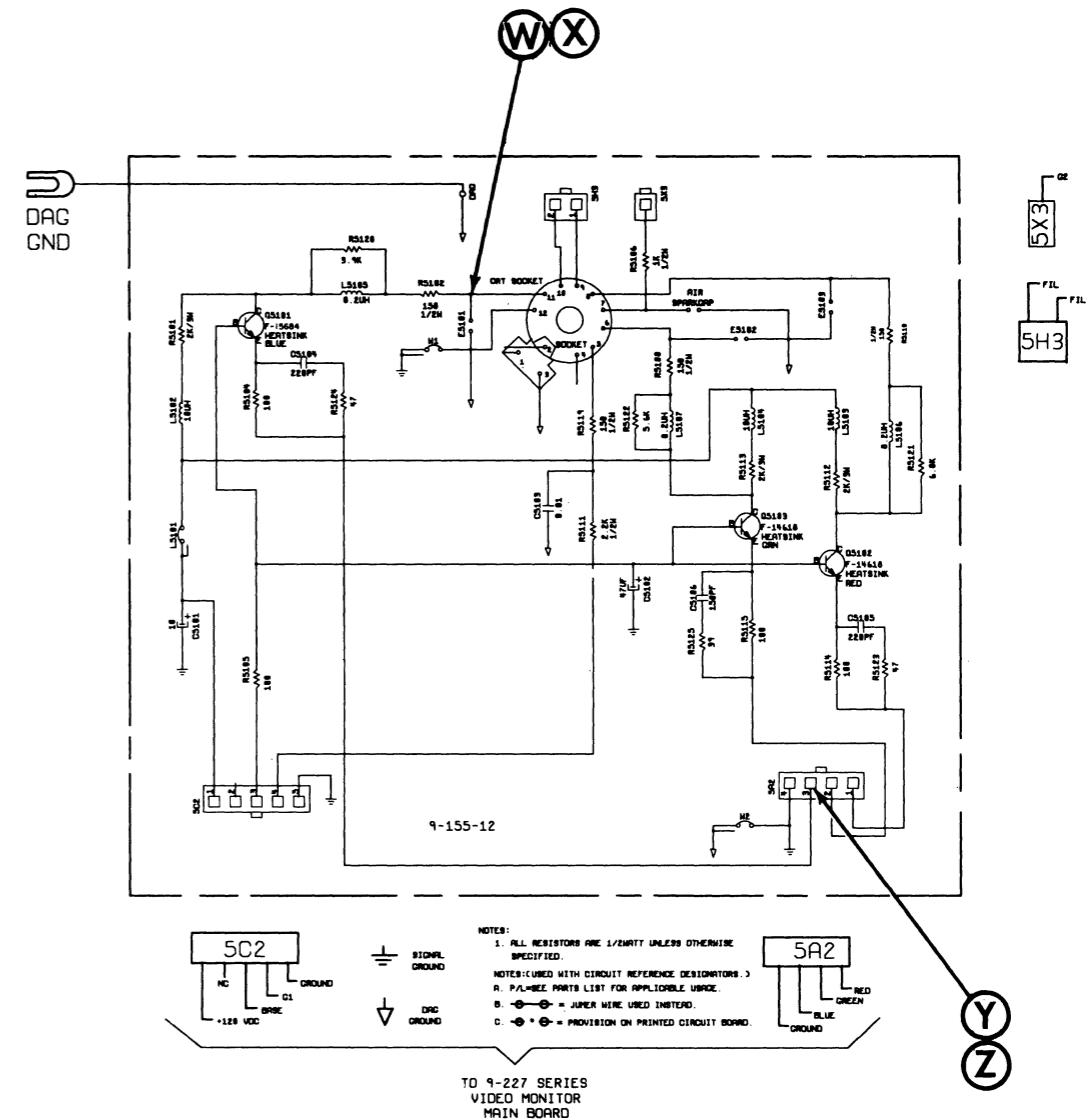


Figure 27
Video Output Board (High-Resolution)
Schematic

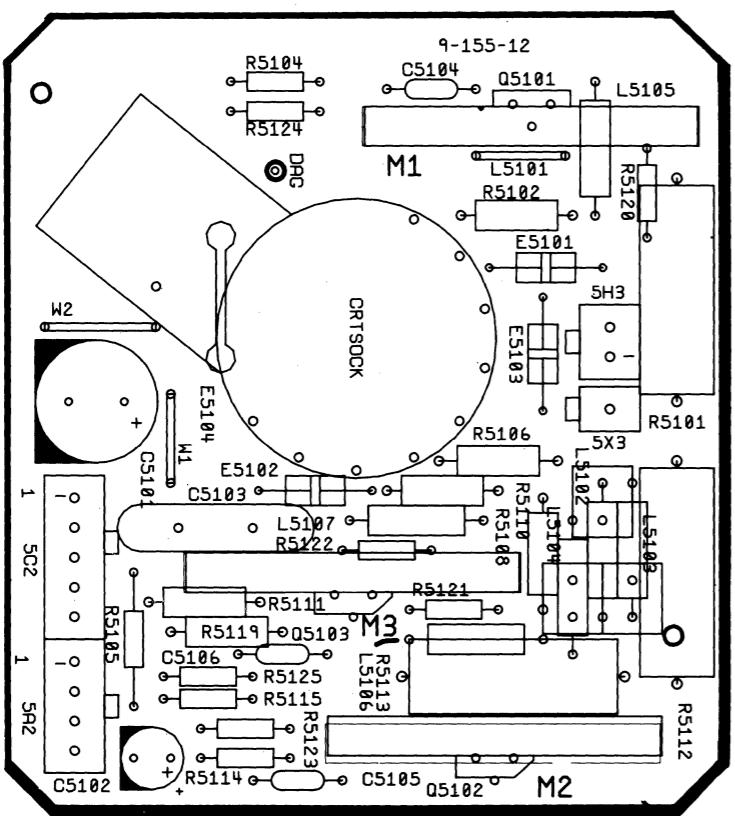


Figure 28
Video Output Board (Medium-Resolution)
Component Location

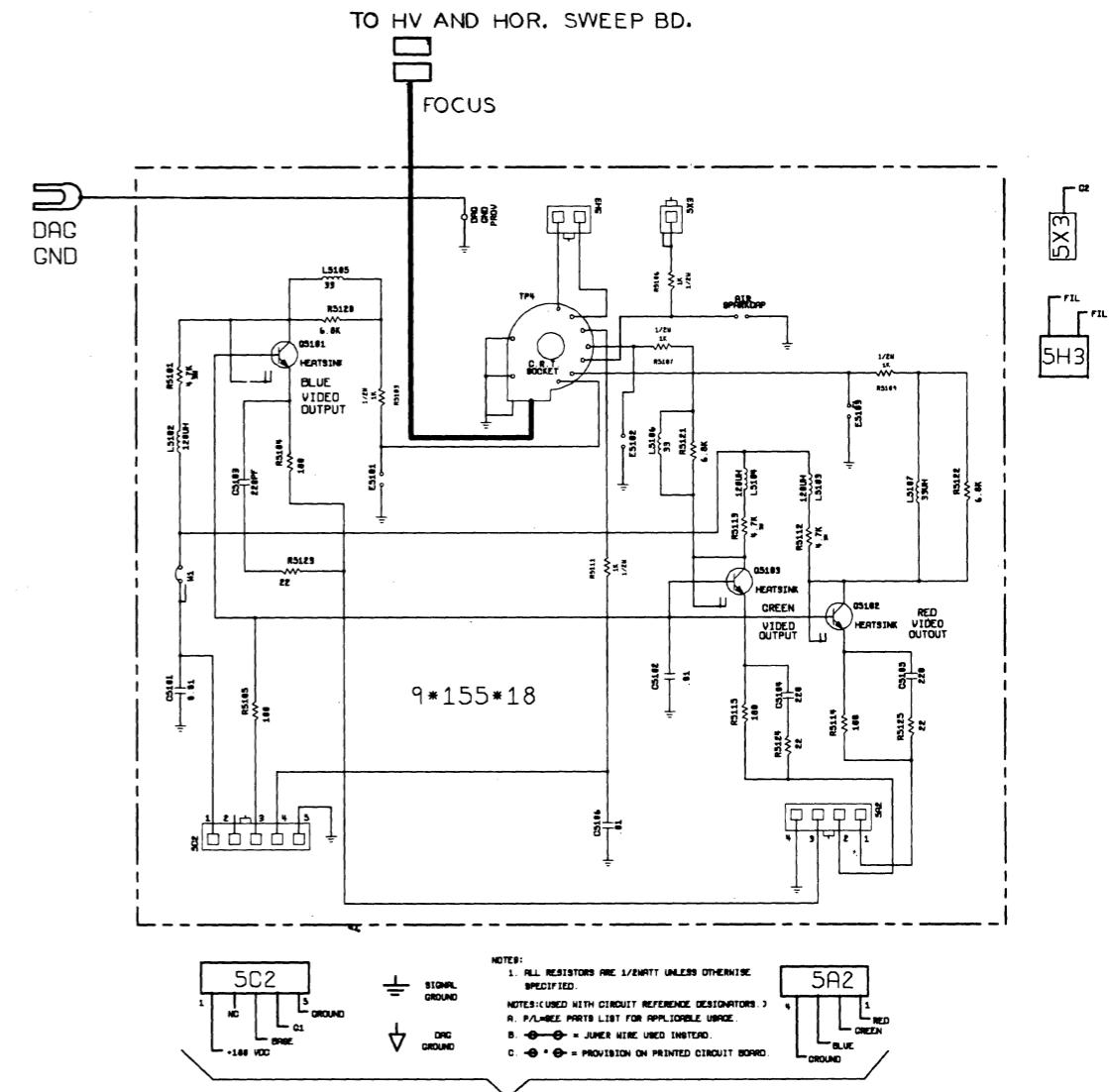


Figure 29
Video Output Board (Medium-Resolution)
Schematics

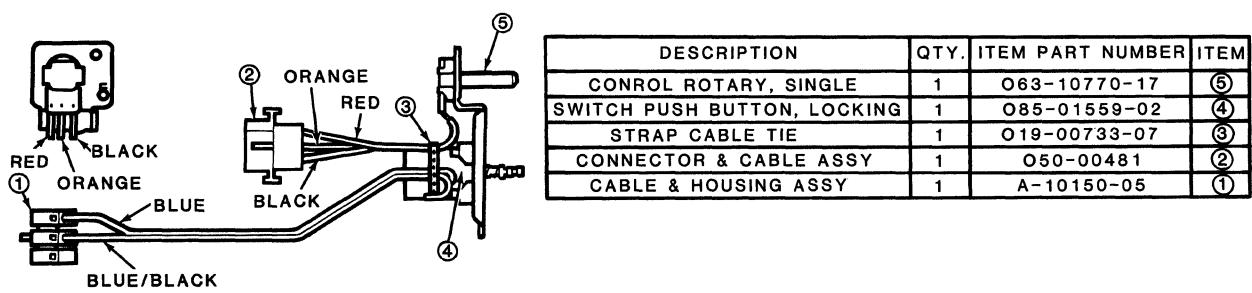


Figure 30
Primary Control Board A-12800
Component Location

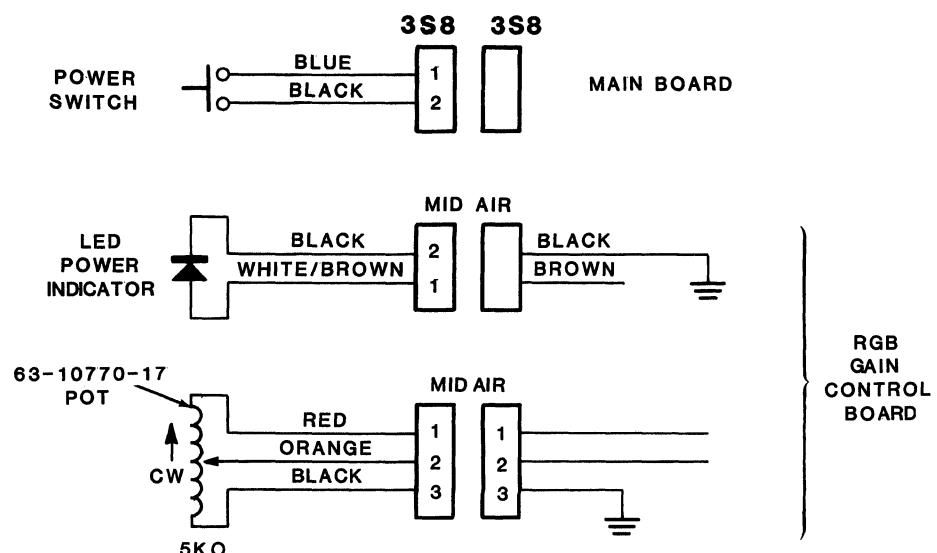


Figure 31
Primary Control Board A-12800 Schematic

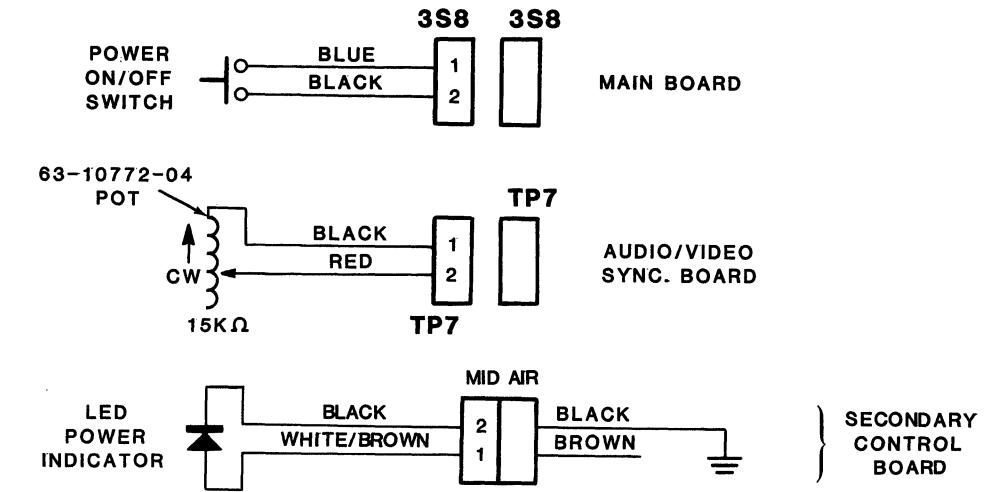


Figure 32
Primary Control Board F-15012 Schematic

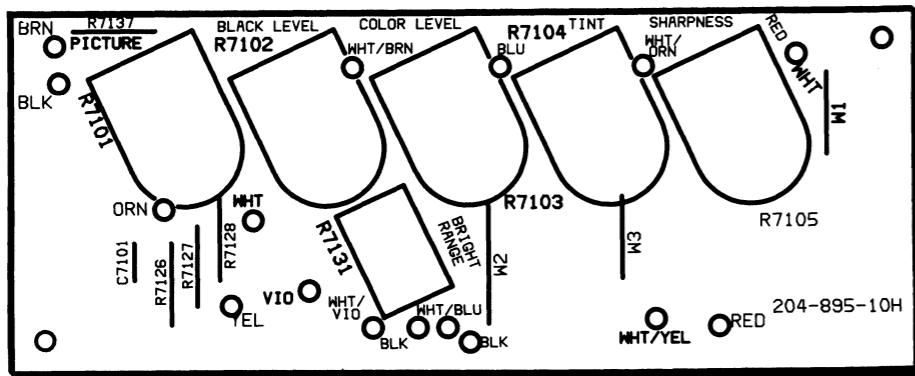
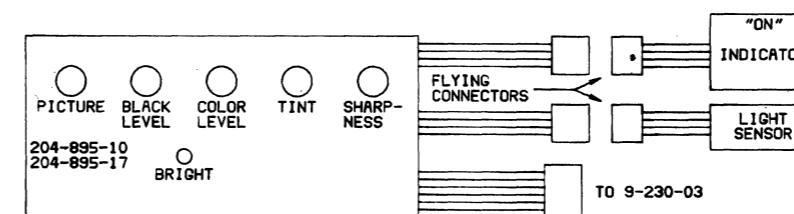
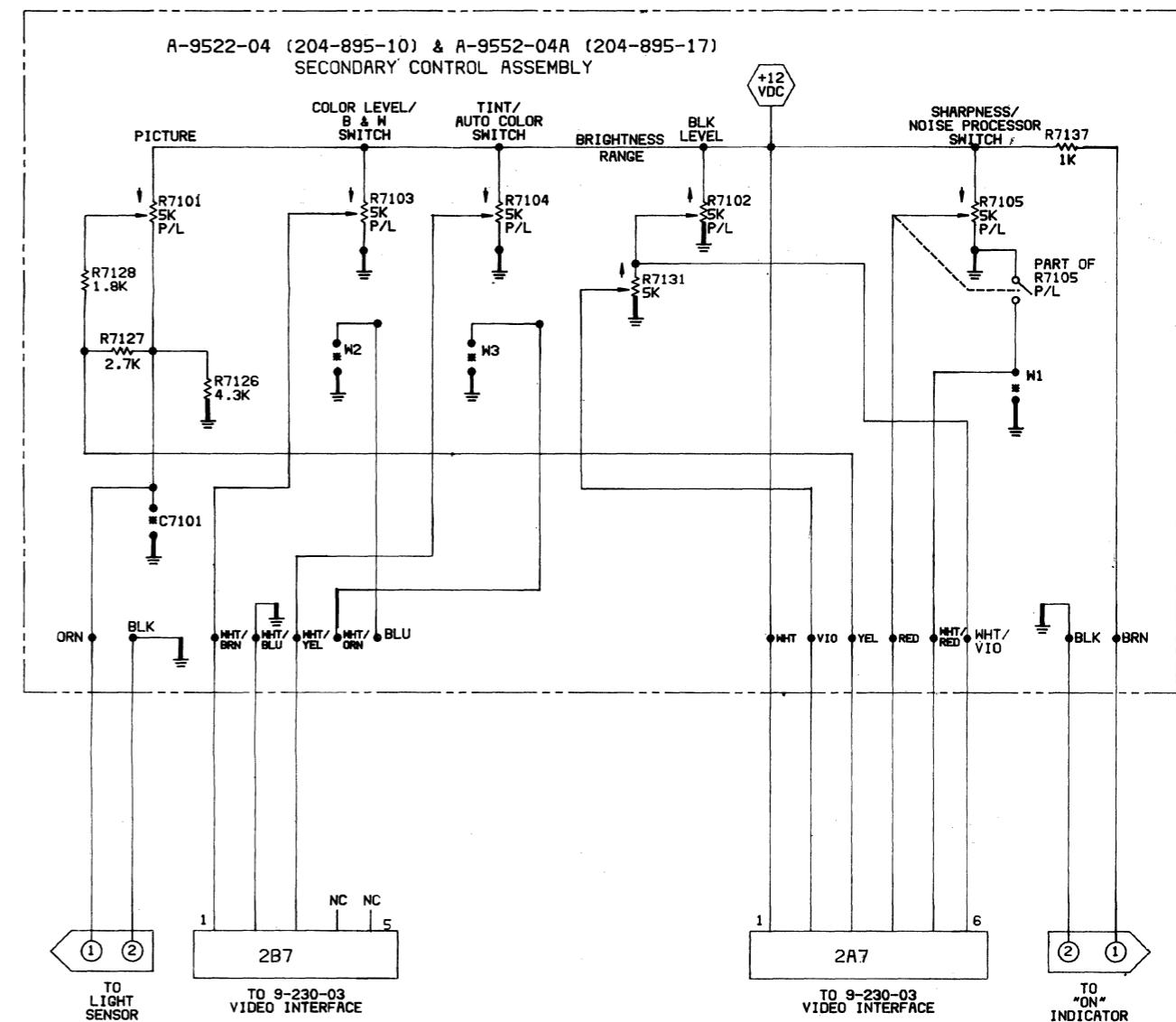


Figure 33
Secondary Assembly A-9522
Component Location



NOTES: (USED WITH CIRCUIT REFERENCE DESIGNATORS)
A. P/L = SEE PARTS LIST FOR APPLICABLE USAGE.
B. - - - = JUMPER WIRE USED INSTEAD.
C. - * - = PROVISION ON PRINTED CIRCUIT BOARD.

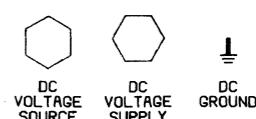


Figure 34
Secondary Assembly A-9522 Schematic

Disassembly/Reassembly

This section, along with Figure 35 Fold-out from page 88, provides instructions to both disassemble and reassemble the monitor. The step-by-step instructions are written for disassembly. For reassembly, perform steps in the reverse order except when instructed to do otherwise.

WARNING: Be sure the signal and power cables are unplugged from the computer or other signal source before disassembling the monitor.

BACK COVER (10)

1. Disconnect the power cable from the power source.
2. Disconnect all cables from the rear of the monitor.
3. Remove the four screws (05) from the back cover (10) and pull the cover back and away from the monitor.

TOP COVER (20)

Remove the two screws (15) from the bottom of the cabinet and lift the top cover (20) up and toward the rear of the monitor.

VIDEO OUTPUT BOARD (70)

1. Carefully remove the video output board from the neck of the CRT and disconnect cable connectors 5A2, 5C2, 5X3, and 5H3.
2. Disconnect the focus lead by twisting the halves of the connector and pulling them apart.
3. Disconnect the gray grounding wire from the grounding strap at the CRT.

INPUT PANEL (40)

1. Remove the two screws (35) and pull the input panel (40) away from the chassis.
2. Disconnect the cables holding the input panel to the main board.

HIGH VOLTAGE AND HORIZONTAL SWEEP ASSEMBLY (77)

WARNING: Discharge the high voltage at the anode lead to the CRT using a jumper lead connected between the chassis and a screwdriver. Otherwise, shock or injury may result. Refer to the inset of Figure 35.

Remove the four screws (75) holding the board to the chassis and disconnect all cables from the assembly.

CRT (105)

WARNING: Discharge the high voltage at the anode lead to the CRT using a jumper lead connected between the chassis and a screwdriver. Otherwise, shock or injury may result. Refer to the inset of Figure 35.

1. Place the cabinet so that the face of the CRT is down and resting on a soft material.
2. Remove the four cable ties (90) holding the degaussing cable (92) to the CRT (105). Cut these cable ties now and replace them during reassembly.

NOTE: The two top cable ties also hold duroid barriers (93) in place.

3. Remove the two duroid barriers.
4. Remove the four screws (95) holding the CRT (105) to the chassis. The upper right assembly also holds the grounding strap (100).
5. Carefully lift the CRT up and away from the cabinet.

PRIMARY CONTROL BOARD (125)

1. Remove the back cover (10) and the top cover (20).
2. Disconnect the cables from the primary control board.
3. Remove the four screws holding the cabinet front (150) to the right and left mounting plates. Remove the cabinet front.

4. Remove the two screws (120) securing the primary control board and remove the control board from the cabinet front.

NOTE: The control knobs do not have to be removed because they will fit through the openings in the front of the cabinet.

AUDIO/VIDEO SYNC BOARD (65)

This board is mounted in plastic guides on the left side of the monitor.

1. Remove the two screws (25) and then remove the top brace (30) from the chassis.
2. Remove the screw (45) from the forward guide (55).
3. Remove the screw (50) from the rear guide (60).
4. Disconnect all cables from the board.
5. Remove the rear guide (60), the board (65), and the forward guide (55) from the chassis.

MAIN BOARD (85)

The main board is mounted on two plastic guides that are bolted to the chassis.

1. Spring the retaining clips to free the board from the two plastic guides (80).
2. Disconnect all cables from the board (85) and lift it out of the cabinet.

SPEAKER (115)

Remove the four screws (110) holding the speaker (115) to the cabinet and pull the speaker toward the rear and away from the cabinet.

SECONDARY CONTROL ASSEMBLY (ZVM-131 and ZVM-135) (135)

1. Remove the back cover (10) and the top cover (20).
2. Disconnect the cables from the secondary control assembly.
3. Remove the four screws holding the cabinet front (150) to the right and left mounting plates. Remove the cabinet front.
4. Remove the two screws (130) securing the secondary control assembly and remove the control assembly from the cabinet front.

NOTE: The control knobs do not have to be removed because they will fit through the openings in the front of the cabinet.

RGB GAIN CONTROL BOARD (ZVM-133 and ZVM-136) (135)

1. Remove the back cover (10) and the top cover (20).
2. Disconnect the cables from the RGB gain control board.
3. Remove the four screws holding the cabinet front (150) to the right and left mounting plates. Remove the cabinet front.
4. Remove the two screws (130) securing the RGB gain control board and remove the board from the cabinet front.

NOTE: The control knobs do not have to be removed because they will fit through the openings in the front of the cabinet.

Parts List

All part numbers in this manual are identified in the following tables of parts lists: Table 2: Monitor Major Assemblies, Table 3: Cable Assemblies, and Table 4 through Table 13 board and assembly components. Refer to Figure 35 fold-out from page 88 for reference numbers of Table 2.

CAUTION: Some of the ICs (integrated circuits) used in this unit are electrostatic-sensitive devices (ESD). These devices can be damaged by static electricity. When handling any IC, use a wrist grounding strap or be sure to equalize the static charge before touching the IC.

IMPORTANT SAFETY NOTICE: Under no circumstances should the original design be modified or altered without permission from Zenith Electronics Corporation. All components should be replaced only with types identical to those

in the original circuit, and their physical location, wiring, and lead dress must conform to the original layout upon completion of repairs.

In some instances, redundant circuitry is incorporated for additional protection and X-radiation protection. Special circuits are also used to prevent shock and fire hazard. **These special circuit components, which contain X in their reference designator, are to be replaced with identical components only.**

NOTE: Unless otherwise specified, all resistors are 1/4-watt, 5% tolerance.

In the following parts lists, N/A refers to "Not Assigned" parts for which there is no replacement part number assigned.

Table 2
Monitor Major Assemblies

REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION
05	114-1270	Screw, back cover, 8-18 x .625 hex head
10	14-11514-01	Back cover (ZVM-131)
15	112-2262-05	Screw, cover glue block, 8-18 x 1.250 phillips
20	14-11529-01	Top cover
25	114-802-01	Screw, cross brace, 8-18 x .375 hex head
	or 114-802	Screw, cross brace, 8-18 x .312 hex head
30	12-8298	Cross brace
35	114-1100-01	Screw, to input panel
40	A-12155	Input panel assembly (ZVM-131)
45		Audio/video sync board forward guide screw
50		Audio/video sync board rear guide screw
55	12-7850-01	Audio/video sync board forward guide
60	12-7850-01	Audio/video sync board rear guide
65	9-230-02	Audio/video sync board (ZVM-131)
70	9-155-18	Video output board (ZVM-131)
70	9-155-12	Video output board (ZVM-135)
74	12-8130	Width board mounting bracket
75	114-1270	Screw, high voltage and power supply board
76	114-984	Screw, width board to bracket
77	A-11106-02	Sweep module and power supply assembly
77	9-247	High voltage and power supply board
78	A-10530	Width Step board
79	114-802	Screw, bracket to sweep and power supply assembly
80	12-8228	Main board left mounting guide

Table 2 (Continued)
Monitor Major Assemblies

REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION
81	114-1270	Screw, main board left mounting guide
82	12-8228	Main board right mounting guide
83	114-1393	Screw, main board right mounting guide
85	9-227-05	Main board (use for prior revision levels)
90	19-733-04	Cable tie
91	19-733-09	Cable tie
92	20-3918-09 or 20-3918-20	Degaussing coil (ZVM-131)
93		Degaussing coil (ZVM-131)
100	127-226-01	Duroid barriers
103		Contact, CRT ground washer, see item 104
104	114-601	Screw, CRT mounting, 10-16 x .500 hex w/washer
105	HE-234-545 100-679-02 95-3387-05 A-7690-03	CRT (ZVM-131): CRT (ZVM-131) Deflection yoke (ZVM-131) Convergence and Purity Magnet Assembly (ZVM-131)
105	HE-234-547 HE-234-547 or HE-234-455 114-1379	CRT (ZVM-133) CRT (ZVM-135) CRT (ZVM-135) Screw, speaker mounting
110		
115	49-1332	Speaker
120	114-1402	Primary control board screws
125	N/A	Primary control board and light sensor
ns	A-08846	Knob assembly, volume control
ns	46-10333	Knob
ns	80-02166	Knob retaining spring
ns	49-1332	Knob, on/off
126	A-10675	LED, cable, and housing (ZVM-131)
	19-1000	Clip, LED mounting

Table 2 (Continued)**Monitor Major Assemblies**

REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION
130	114-1402	Secondary control board screws
135	A-9522	Secondary control board
140	114-1393	Screw, chassis
141		Insulating standoffs
145	12-8215	Bottom plate
145	12-8416	Perforated bottom plate
146	A-11847	Power cable
146	50-347	Power cable assy
147	125-198-07	Power cable strain relief
ns	114-1425-01	Screw, AC line, ground to frame
150	14-11516-05	Cabinet front (ZVM-131)
ns	114-1402	Screw, cabinet front to right & left CRT plate
151	12-8214	Right chassis CRT mounting plate (-135)
	12-8214-07	Right chassis CRT mounting plate (-131)
152	12-8214-01	Left chassis CRT mounting plate (-135)
	12-8214-06	Left chassis CRT mounting plate (-131)
155	14-11515-01	Cabinet bottom (ZVM-131)

Table 3**Cable Assemblies**

CABLE IDENTIFIER	ZDS PART NUMBER	DESCRIPTION
2A5 - 5A2	A-9882-01	
or	A-9925-08	
2A7	A-9919-43	from primary control board
2B5/5C2	A-9882-08	
2B5 5C2	A-9882-17	
3D3	A-9919-26	
3F3	A-9913-29	
3G3	A-9917	
	A-10080	includes housing

Table 3 (Continued)**Cable Assemblies**

REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION
3S3	A-9941-11	
3S8	A-10150-05	
3T3	A-9939-24	
3R3	A-9943-10	
3V3	A-9941-23	
3W3	A-9943-07	
		includes capacitor (22-7735-01)
5H3	A-9911-58	
5X3	A-9939-18	
9E4	A-11218-03	
9F2	A-11231	
C	A-9912-04	
C1	A-9913-43	
C2	A-9913-44	
E	A-9915-50	
E	A-9915-70	
TP6	A-10039-11	
TP7	A-9911-79	from LED
X/Y	A-9919-44	

Miscellaneous

ZDS PART NUMBER	DESCRIPTION
114-802	Screw, 8-18 x .312
114-804	Screw, 8-18 x .500
114-805	Screw, 6-2 x .375
114-1115-02	Screw, 6-20 x .375
114-1274	Screw, 8-18 x .625
114-1393-01	Screw, 8-10 x .625
114-1393-03	Screw, 8-10 x .750
114-1393-04	Screw, 8-10 x 1.00
114-1393-05	Screw, 8-10 x .380
114-1393-09	Screw, 8-10 x .560
114-1393-10	Screw, 8-10 x .500
114-1395-01	Screw, 8-10 x .750
114-1425	Screw, 8-18 x .500
69-345-03	Screw, 4-40 x .312

Table 4
Main Board (9-227 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL						
			-00	-01	-02	9-227 -03	-04	-05	-05A
Capacitors									
C2101	22-7775-10	.0068 μ F polyester	x		x	x	x		
C2101	22-7774-14	.015 μ F polyester		x				x	x
C2102	22-7775-24	0.1 μ F polyester	x		x	x	x		
C2102	22-7774-16	.022 μ F polyester		x				x	x
C2103	22-7709-09	100 μ F electrolytic	x	x	x	x	x	x	x
C2103	22-7861-09	100 μ F electrolytic						x	x
C2104	22-7613-24	.01 μ F disc	x	x	x	x	x	x	x
C2105	22-7390-02	.47 μ F electrolytic	x	x	x	x	x	x	x
C2105	22-7862	.47 μ F electrolytic						x	x
C2106	22-7710-07	33 μ F electrolytic	x	x	x	x	x	x	x
C2106	22-7862-07	33 μ F electrolytic						x	x
C2107	22-7774-14	.015 μ F polyester		x				x	x
C2107	22-7615-03	.0033 μ F disc	x		x	x	x		
C2110	22-7742-10	.001 μ F polyester	x	x	x	x	x	x	x
C2111	22-7774-17	.027 μ F polyester	x	x	x	x	x	x	x
C2176	22-7861-13	1000 μ F electrolytic	x	x	x	x	x	x	x
C2501	22-7621-42	220 pF disc	x						
C2502	22-7621-42	220 pF disc	x						
C2503	22-7621-42	220 pF disc	x						
C2504	(Provision for .01 μ F)		*						
C2504	22-7859-10	220 μ F electrolytic		x	x	x	x	x	x
C3201	22-7775-24	0.1 μ F polyester	x	x					
C3204	22-7603	4.7 μ F electrolytic	x						
C3205	22-3512	.01 μ F disc	x	x	x	x	x	x	x
C3206	22-7603-01	10 μ F electrolytic	x	x	x	x	x	x	x
C3207	22-7742-10	.001 μ F axial	x	x	x	x	x	x	x
C3208	22-7742-10	.001 μ F axial	x						
C3209	22-7395	470 pF disc	x	x	x	x	x	x	x
CX3230	Provision for 22-07431-01		*						
C3234	22-7395	470 pF disc	x	x	x	x	x	x	x
C3236	22-7861-14	2200 μ F electrolytic	x	x	x	x	x	x	x
C3242	22-5685	100 pF disc		x	x	x	x		
C3242	22-7395	470 pF disc						x	x
C3242	Provision for 22-05688		*						
C3246	22-7603-01	10 μ F electrolytic	x						
C3246	22-7678	100 μ F electrolytic		x	x	x	x		
C3246	22-7832-10	100 μ F electrolytic						x	x
C3246	72-7954	100 μ F electrolytic						x	x
C3247	22-7895-12	680 μ F electrolytic	x	x	x				
C3247	22-7860-12	470 μ F electrolytic				x	x		
C3247	22-7860-29	680 μ F electrolytic						x	x

Table 4 (Continued)
Main Board (9-227 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-227						
			-00	-01	-02	-03	-04	-05	-05A
C3249	22-7431-06	.0047 μ F disc	x	x	x	x	x	x	x
C3250	22-7431-06	.0047 μ F disc						x	x
CX3250	22-7431-06	.0047 μ F disc	x	x	x	x	x		
C3251	22-7811-	.001 μ F disc	x	x	x	x	x	x	x
C3252	22-7811-	.001 μ F disc	x	x	x	x	x	x	x
C3253	22-7811-	.001 μ F disc	x	x	x	x	x	x	x
C3254	22-7900	22 μ F electrolytic		x	x	x	x		
C3254	22-7900-01	22 μ F NP electrolytic						x	x
C3254	22-7404-06	22 μ F electrolytic			x				
C3256	22-7861-14	2200 μ F electrolytic	x	x	x	x	x	x	x
C3257	22-7395	470 pF disc	x	x	x	x	x	x	x
CX3258	19-733-01	Cable retainer						x	x
CX3258	22-5854	0.1 μ F			x			x	x
CX3258	79-91	Sleeving						x	x
C3401	22-7613-24	.01 μ F disc	x						
C3402	22-7406-01	1.0 μ F electrolytic		x	x	x	x	x	x
C3402	22-7406-01	1.0 μ F electrolytic	x						
C3403	22-7773-18	.033 μ F polyester	x	x	x	x	x	x	x
C3404	22-7773-17	.027 μ F polyester	x	x	x	x	x	x	x
C3405	22-7775-08	.0068 μ F polyester		x	x	x	x	x	x
C3407	22-7710-01	1.0 μ F electrolytic	x	x	x	x	x		
C3407	22-7862-10	1 μ F electrolytic						x	x
C3409	22-7709-09	100 μ F electrolytic	x	x	x	x	x	x	x
C3409	22-7861-09	100 μ F electrolytic						x	x
C3410	22-7404-06	22 μ F electrolytic	x	x	x	x	x	x	x
C3411	22-7708-09	100 μ F electrolytic	x	x	x	*	*		
C3411	22-7860-09	100 μ F electrolytic						x	x
C3412	22-7710-01	1.0 μ F electrolytic	x	x	x	x	x		
C3412	22-7862-01	1 μ F electrolytic						x	x
C3413	22-7562-32	.47 μ F polyester	x	x	x	x	x	x	x
C3414	22-7774-16	.022 μ F polyester	x	x	x	x	x	x	x
C3416	22-7802-07	.01 μ F axial	x	x	x	x	x	x	x
C3419	22-7751-39	180 pF axial	x	x				x	x
C3420	22-7710-01	1.0 μ F electrolytic	x	x	x	x	x		
C3420	22-7862-01	1 μ F electrolytic						x	x
C3421	22-7773-18	.033 μ F polyester	x	x	x	x	x	x	x
C3422	22-7613-24	.01 μ F disc	x	x	x	x	x	x	x
C3423	22-7613-08	470 pF disc	x	x	x	x	x	x	x
C3423	22-7613-08	470 pF disc	x	x	x	x	x	x	x

Table 4 (Continued)
Main Board (9-227 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-227						
			-00	-01	-02	-03	-04	-05	-05A
C3424	22-7742-05	390 pF axial	x	x	x	x	x	x	x
C3425	22-7742-10	.001 μ F axial	x	x	x	x	x	x	x
C3426	22-7742-10	.001 μ F axial	x	x	x	x	x	x	x
C3427	22-7647-35	150 pF axial	x	x	x	x	x	x	x
C3428	22-7774-12	.01 μ F polyester		x	x	x	x	x	x
C3428	22-7774-20	.047 μ F polyester	x						
C3429	22-7405-04	4.7 μ F electrolytic	x						
C3429	22-7406	.47 μ F electrolytic		x	x	x	x	x	x
C3430	22-7613-24	.01 μ F disc	x	x	x	x	x	x	x
C3431	22-7774-16	.022 μ F polyester	x	x	x	x	x	x	x
C3432	(Provision for 22-07509-04)		*	*	*	*	*	*	
C3434	22-7742-06	470 pF axial	x	x	x	x	x	x	x
C3435	22-7613-24	.01 μ F disc		x	x	x	x	x	x
C3435	(Provision for 22-07709-06)		*						
C3436	22-7742-10	.001 μ F axial	x						
C3436	22-7774-12	.01 μ F polyester						x	x
C3450	22-7739.29	.27 μ F polyester	x						
C3450	22-7619-41	200 pF disc		x	x	x	x	x	x
C3453	(Provision for 22-07709-06)			*	*	*	*	*	
C3461	22-7710-01	1.0 μ F electrolytic	x	x	x	x	x		
C3461	22-7862-01	1 μ F electrolytic						x	x
C3462	22-7710-01	1.0 μ F electrolytic	x						
C3462	22-7774-09	.0056 μ F polyester						x	x
C3463									
Chokes									
L2501		Wire, 22 gauge	x						
L2501	20-3831	Coil, peaking, 663 μ H		x	x	x	x	x	x
L2502	20-3887-01	Coil, peaking, 1.2 μ H	x	x	x	x	x		
L2503	20-3887-01	Coil, peaking, 1.2 μ H	x	x	x	x	x		
L2504	20-3887-01	Coil, peaking, 1.2 μ H	x	x	x	x	x		
L3201	20-2021	Coil, peaking, 100 μ H	x						
L3201		Solid wire, 22 gauge		x	x	x	x		
L3201	91-2053	Wire, 22 gauge						x	x
LX3202	95-3501-01	Transformer, 60 μ H	x						
LX3202	95-3501-02	Transformer, 60 μ H		x	x	x	x	x	x
L3401	20-3831	Coil, peaking, 663 μ H	x	x	x	x	x	x	x
L3402	20-3998	Coil, peaking, 39 μ H	x						
L3402	20-4026	Coil, tunable, 39 μ H		x	x	x	x	x	x

Table 4:(Continued)
Main Board (9-227 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-227						
			-00	-01	-02	-03	-04	-05	-05A
Connectors									
A	86-799	Connector pins (4)	x	x	x	x	x		
B	86-799	Connector pins (4)	x	x	x	x		x	
C	83-9239-02	Terminal strip, 2-pos.	x	x	x	x			
D	83-9239-04	Terminal strip, 3-pos.	x	x	x	x			
D	58-436-01	Terminal strip, 3-pos.					x		
E	83-9230-03	Terminal strip, 6-pos.	x	x	x	x			
E	58-363-02	Terminal strip, 6-pos.					x		
X	86-799	Connector pins (3)	x	x	x	x			
Y	86-799	Connector pins (3)	x	x	x	x			
3D3	86-799	Connector pins (6)	x	x	x	x	x		
3F3	86-799	Connector pins (2)	x	x	x	x	x		
3G3	86-799	Connector pins (5)	x	x	x	x	x		
3R8	86-799	Connector pins (3)	x	x	x	x	x		
3S8	86-799	Connector pins (3)	x	x	x	x	x		
3T8	86-799	Connector pins (2)	x	x	x	x	x		
2A8	A-9915-62	Housing/Terminal Assy				x	x		
3V3	86-799	Connector pins (2)	x	x	x	x	x		
3W3	86-799	Connector pins (3)	x	x	x	x	x		
2M	78-3065	Connector, 2M, 2-pos.	x	x	x	x	x		
5M	78-3056	Connector, 5M, 2-pos.	x	x	x	x	x		
MED-HIGH-RES	78-3056	Connector, 2-pos.	x	x	x	x	x		
Diodes									
CR2104	103-142-01	Low voltage	x	x	x	x	x	x	x
CR2105	103-254-01	Low voltage	x	x	x	x	x	x	x
CR2106	103-254-01	Low voltage	x	x	x	x	x	x	x
CR2107	103-254-01	Low voltage	x	x	x	x	x	x	x
CR2108	103-279-14	Low voltage	x	x	x	x	x	x	x
CR2501	103-142-01	Low voltage	x	x	x	x	x		
CR2501	103-142-02	Low voltage					x	x	
CR2502	103-142-01	Low voltage	x	x	x	x	x		
CR2502	103-142-02	Low voltage					x	x	
CR2503	103-142-01	Low voltage	x	x	x	x	x		
CR2503	103-142-02	Low voltage					x	x	
CR2504	Provision for 103-254-01		*	*	*	*			
CR2505	Provision for 103-254-01		*	*	*	*			

Table 4 (Continued)
Main Board (9-227 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-227						
			-00	-01	-02	-03	-04	-05	-05A
CR2506		Provision for 103-254-01		*	*	*	*		
CR2507	103-142-01	Low voltage						x	x
CR2508	103-142-01	Low voltage						x	x
CR2509	103-142-01	Low voltage						x	x
CR2510	103-142-01	Low voltage						x	x
CR2511	103-142-01	Low voltage						x	x
CR2512	103-142-01	Low voltage						x	x
CR3202	103-330	Low voltage	x	x	x	x	x	x	x
CR3205	103-309-01	Zener, 10 volt	x	x	x	x	x	x	x
CR3206	103-254-01	Low voltage	x						
CR3207	103-254-01	Low voltage	x						
CR3207	91-2053	Wire, 22 gauge		x	x	x	x		
CR3208	103-326	Wire, 22 gauge	x	x	x	x	x	x	x
CR3210	103-254-01	Low voltage	x	x	x	x	x	x	x
CR3211	103-254-01	Low voltage	x	x	x	x	x	x	x
CR3214	103-284	Low voltage	x			x	x		
CR3214	103-326	Low voltage		x	x			x	x
CR3217	103-377-04	Low voltage	x	x	x	x	x	x	x
CR3219	103-330	Low voltage	x	x	x	x	x	x	x
CR3223	103-330	Low voltage	x	x	x	x	x	x	x
CR3224	103-330	Low voltage	x	x	x	x	x	x	x
CR3231	103-315-06		x	x	x	x	x	x	x
CR3232	103-315-06		x	x	x	x	x	x	x
CR3233	103-315-06		x	x	x	x	x	x	x
CR3234	103-315-06		x	x	x	x	x	x	x
CR3235	103-284	Low voltage	x	x	x	x	x	x	x
CR3401	103-142-01	Low voltage	x	x	x	x	x	x	x
CR3404	103-142-01	Low voltage	x	x	x	x	x	x	x
CR3405	103-142-01	Low voltage	x	x	x	x	x	x	x
CR3406	103-142-01	Low voltage	x	x	x	x	x	x	x
CR3407	91-2053	Wire, 22 gauge						x	x
CR3407		Wire, 22 gauge	x	x	x	x	x		
CR3408	103-279-14	Zener, 6.8 volt	x	x	x	x	x	x	x
CR3409	103-279-19	Zener, 10 volt	x	x	x	x	x	x	x
Fuses									
FX3202		Wire, 22 gauge	x						
FX3201	136-113-23	Fuse, 4 amp, FB	x	x	x	x	x		

Table 4 (Continued)

Main Board (9-227 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-227						
			-00	-01	-02	-03	-04	-05	-05A
Integrated Circuits									
IC3401	78-3014-07	Socket						x	x
IC3401	221-264	Horizontal/Vertical	x	x	x	x	x	x	x
IC3401	221-175	Horizontal/Vertical							
Miscellaneous									
T3201	95-3558-03	Transformer, Start Up		x	x	x	x		
TX3201	95-3558-03	Transformer, Power	x	x	x	x	x	x	x
TX3202	95-3439	Transformer, LCI							
TX3202	95-3439	Coil						x	x
	204-976	PC board	x						
	204-976-02	PC board		x	x	x	x		
Transistors									
Q2101		Assembly	x	x		x	x		
	19-957-03	Clip	x	x		x	x		
	121-1072	Transistor	x	x		x	x		
	126-2028-01	Heat sink	x	x		x	x		
Q2101	121-1072-01	Transistor			x				
	125-2028-03	Heat sink			x				
Q2102		Assembly	x	x					
	19-957-03	Clip	x	x				x	x
	121-1072	Transistor	x	x					
	126-02028-01	Heat sink	x	x					
Q2102	121-1072-01	Transistor			x		x	x	
	125-2028-03	Heat sink			x				
	126-02028-04	Heat sink							
Q2103	121-975	NPN	x	x	x	x	x	x	x
Q2104	121-1064	PNP	x	x	x	x	x	x	x
Q2501	121-1019	PNP	x	x	x	x	x	x	x
Q2502	121-895	NPN	x						
Q2502	121-551	NPN		x	x	x	x	x	x
Q2503	121-1019	PNP	x	x	x	x	x	x	x
Q2504	121-895	NPN	x						
Q2504	121-551	NPN		x	x	x	x	x	x
Q2505	121-1019	PNP	x	x	x	x	x	x	x

Table 4 (Continued)
Main Board (9-227 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL						
			-00	-01	-02	9-227 -03	-04	-05	-05A
Q2506	121-895	NPN	x						
Q2506	121-551	NPN		x	x	x	x	x	x
Q2507	121-1019	PNP		x	x	x	x	x	x
Q2508	121-1019	PNP		x	x	x	x	x	x
Q2509	121-1019	PNP		x	x	x	x	x	x
Q3200	A-12791	Assembly	x	x	x	x	x	x	x
	19-857-01	Clip	x	x	x	x	x	x	x
	19-956-01	Clip	x	x	x	x	x	x	x
	121-966-02	Transistor	x	x	x	x	x	x	x
	126-2029-02	Heat sink	x	x	x	x	x	x	x
Q3201	121-499-01	NPN	x	x	x	x	x	x	x
Q3202	121-1034	NPN	x	x	x	x	x	x	x
Q3203	121-1059	PNP	x	x	x	x	x	x	x
Q3204	121-986	Transistor						x	x
Q3401	121-895	NPN	x	x	x	x	x	x	x
Q3402	121-896	PNP	x	x	x	x	x	x	x
Q3403	121-895	NPN	x	x	x	x	x	x	x
Q3404	121-895	NPN	x	x	x	x	x	x	x
Q3405	121-895	NPN	x	x	x	x	x	x	x
Resistors									
RX2101	63-10565-32	22 Ω, film	x	x	x	x	x	x	x
R2102	63-10243-56	220 Ω, film	x	x	x	x	x	x	x
R2103	63-10235-88	4.7 kΩ, film	x	x	x	x	x	x	x
R2104	63-10243-11	3 Ω, film						x	x
RX2104	63-10243-11	3.0 Ω, film	x	x	x	x	x	x	x
RX2105	63-10243-11	3.0 Ω, film	x	x	x	x	x	x	x
R2106	63-10235-72	1.0 kΩ, film	x	x	x	x	x	x	x
R2107	63-10235-66	560 Ω, film	x	x	x	x	x	x	x
R2108	63-10235-66	560 Ω, film	x	x	x	x	x	x	x
R2109	63-10565	1.0 Ω, film	x	x	x	x	x	x	x
R2110	63-10565	1.0 Ω, film	x	x	x	x	x	x	x
R2111	63-10565	1.0 Ω, film	x	x	x	x	x	x	x
R2112	63-10565	1.0 Ω, film	x	x	x	x	x	x	x
R2113	63-10243-60	330 Ω, film	x	x	x	x	x	x	x
R2114	63-10235-72	1 kΩ, film	x	x	x	x	x	x	x
R2115	63-10235-88	4.7 kΩ, film	x	x	x	x	x	x	x
R2116	63-10235-56	220 Ω, film	x						
R2116	63-10235-60	330 Ω, film		x	x	x	x	x	x
R2117	63-10235-80	2.2 kΩ, film	x	x	x	x	x	x	x
R2118	63-10235-88	4.7 kΩ, film	x	x	x	x	x	x	x
R2119	63-10235-60	330 Ω, film	x						
R2119	63-10235-54	180 Ω, film		x	x	x	x	x	x

Table 4 (Continued)
Main Board (9-227 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-227						
			-00	-01	-02	-03	-04	-05	-05A
R2120	63-10565-08	2.2 Ω , film	x	x	x	x	x	x	x
R2121	63-10828-52	150 Ω , film						x	x
RX2121	63-10565-52	150 Ω , film	x	x	x	x	x		
R2122	63-10828-52	150 Ω , film						x	x
RX2122	63-10565-52	150 Ω , film	x	x	x	x	x		
R2125	63-09063-02	550 Ω , control	x	x	x	*	*		
R2125	63-9023-02	Control						x	x
R2126	63-10243-63	430 Ω , film		x	x	*	*	x	x
R2126	63-10243-53	160 Ω , film	x					x	x
R2127	63-10243-66	560 Ω , film	x						
R2127	63-10832-65	510 Ω , carbon		x	x	*	*	x	x
R2128	63-10243-66	560 Ω , film	x						
R2128	63-10832-65	510 Ω , carbon		x	x	*	*	x	x
R2129	63-10832-56	220 Ω , carbon		x	x	*	*	x	x
R2411	63-10235-67	620 Ω , film		x	x	x	x		
R2501	63-10236-17	75 k Ω , film						x	x
R2501	63-10236-28	220 k Ω , film	x						
R2501	63-10236-52	2.2 M Ω , film		x	x	x	x		
R2502	63-10235-90	5.6 k Ω , film	x	x	x	x	x		
R2502	63-10235-87	4.3 k Ω , film						x	x
R2503	63-10235-56	220 Ω , film	x						
R2503	63-10235-58	270 Ω , film		x	x	x	x		
R2504	63-10235-80	2.2 k Ω , film	x						
R2504	63-10235-88	4.7 k Ω , film						x	x
R2504	63-10235-69	750 Ω , film		x	x	x	x		
R2505	63-10857-11	5 k Ω , control	x						
R2505	63-10857-27	800 Ω , control		x	x	x	x	x	x
R2506	63-10857-11	Control						x	x
R2506	63-10857-30	1 k Ω , control	x						
R2506	63-10857-27	800 Ω , control		x	x	x	x		
R2507	63-10233-76	1.5 k Ω , film							x
R2507	63-10235-76	1.5 k Ω , film	x						
R2507	63-10235-75	1.3 k Ω , film		x	x	x	x	x	
R2508	63-10233-92	6.8 k Ω , film							x
R2508	63-10235-93	7.5 k Ω , film	x						
R2508	63-10235-82	2.7 k Ω , film		x	x	x	x		
R2509	63-10235-80	2.2 k Ω , film	x						
R2510	63-10235-59	300 k Ω , film						x	x
R2510	63-10235-50	120 Ω , film	x						
R2510	63-10235-48	100 Ω , film		x	x	x	x		
R2511	63-10235-91	6.2 k Ω , film						x	x
R2511	63-10235-82	1.2 k Ω , film	x						
R2512	63-10235-28	220 k Ω , film	x						
R2512	63-10236-52	2.2 M Ω , film		x	x	x	x		
R2512	63-10236-17	75 k Ω , film						x	x

Table 4 (Continued)
Main Board (9-227 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-227						
			-00	-01	-02	-03	-04	-05	-05A
R2513	63-10235-90	5.6 kΩ, film	x	x	x	x	x		
R2513	63-10235-87	4.3 kΩ, film						x	x
R2514	63-10235-56	220 Ω, film	x						
R2514	63-10235-58	270 Ω, film		x	x	x	x		
R2515	63-10235-88	4.7 kΩ, film						x	x
R2515	63-10235-80	2.2 kΩ, film	x			x	x		
R2515	63-10235-71	910 Ω, film		x	x	x	x		
R2516	63-10857-32	5 kΩ, control	x						
R2516	63-10857-25	800 Ω, control		x	x	x	x	x	x
R2517	63-10857-32	Control						x	x
R2517	63-10857-30	1 kΩ, control	x						
R2517	63-10857-25	800 Ω, control		x	x	x	x		
R2518	63-10233-76	1.5 kΩ, film							x
R2518	63-10235-76	1.5 kΩ, film	x						
R2518	63-10235-75	1.3 kΩ, film							x
R2518	63-10235-73	1.1 kΩ, film		x	x	x	x		
R2519	63-10235-93	7.5 Ω, film	x					x	x
R2519	63-10235-82	2.7 kΩ, film		x	x	x	x		
R2519	63-10233-92	6.8 kΩ, film							x
R2520	63-10235-80	2.2 kΩ, film	x						
R2521	63-10235-59	300 Ω, film						x	x
R2521	63-10235-50	120 Ω, film	x						
R2521	63-10235-48	1000 Ω, film		x	x	x	x		
R2522	63-10235-74	1.2 kΩ, film	x						
R2523	63-10236-28	220 kΩ, film	x						
R2523	63-10236-52	2.2 MΩ, film		x	x	x	x		
R2523	63-10236-17	75 kΩ, film						x	x
R2524	63-10235-90	5.6 kΩ, film	x	x	x	x	x		
R2524	63-10235-87	4.3 kΩ, film						x	x
R2525	63-10235-56	220 Ω, film	x						
R2525	63-10235-58	270 Ω, film		x	x	x	x		
R2526	63-10235-88	4.7 kΩ, film						x	x
R2526	63-10235-80	2.2 kΩ, film	x						
R2526	63-10235-69	750 Ω, film		x	x	x	x		
R2527	63-10857-31	5 kΩ, control	x						
R2527	63-10857-26	800 Ω, control		x	x	x	x	x	x
R2528	63-10857-31	Control						x	x
R2528	63-10857-30	1 kΩ, control	x						
R2528	63-10857-26	800 Ω, control		x	x	x	x		

Table 4 (Continued)
Main Board (9-227 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-227						
			-00	-01	-02	-03	-04	-05	-05A
R2529	63-10235-76	1.5 kΩ, film	x						
R2529	63-10235-75	1.3 kΩ, film		x	x	x	x	x	x
R2529	63-10233-76	1.5 kΩ, film							x
R2530	63-10235-93	7.5 kΩ, film	x						x
R2530	63-10235-82	2.7 kΩ, film		x	x	x		x	
R2530	63-10233-92	6.8 kΩ, film							x
R2531	63-10235-80	2.2 kΩ, film	x						
R2532	63-10235-59	300 Ω, film						x	x
R2532	63-10235-50	120 Ω, film	x						
R2532	63-10235-48	100 Ω, film		x	x	x	x		
R2533	63-10235-74	1.2 kΩ, film		x	x	x	x		
R2534	63-10235-52	150 Ω, film	x	x	x	x	x	x	x
R2535	63-10235-52	150 Ω, film	x						
R2536	63-10235-52	150 Ω, film	x						
R2537	63-10235-52	150 Ω, film	x						
R2538	63-10235-56	220 Ω, film	x						
R2538	63-10235-48	100 Ω, film		x	x	x	x	x	x
R2539	63-10235-56	220 Ω, film	x						
R2539	63-10235-48	100 Ω, film		x	x	x	x	x	x
R2540	63-10235-56	220 Ω, film	x						
R2540	63-10235-48	100 Ω, film		x	x	x	x	x	x
R2541	63-10235-54	180 Ω, film		x	x	x	x		
R2542	63-10235-53	160 Ω, film		x	x	x	x		
R2542	63-10235-72	1 kΩ, film						x	x
R2543	63-10235-54	180 Ω, film		x	x	x	x		
R2544	63-10235-72	1 kΩ, film						x	x
R2544	63-10235-54	180 Ω, film		x	x	x	x		
R2545	63-10235-54	180 Ω, film		x	x	x	x		
R2546	63-10235-72	1 kΩ, film						x	x
R2546	63-10235-53	160 Ω, film		x	x	x	x		
R2548	63-10235-91	6.2 kΩ		x	x	x	x		
R2548	63-10235-67	620 Ω, film		x	x	x	x		
R2549	63-10235-91	6.2 kΩ, film						x	x
R2549	63-10235-67	620 Ω, film		x	x	x	x		
R2550	63-10235-32	22 Ω, film		x	x	x	x	x	x
R2552	63-10235-32	22 Ω, film		x	x	x	x	x	x
R2554	63-10235-32	22 Ω, film		x	x	x	x	x	x
R3201	63-10235-59	300 Ω, film	x	x	x	x	x	x	x
R3202	63-10235-50	120 Ω, film	x	x	x	x	x	x	x
R3203	63-10235-59	300 Ω, film	x	x	x	x	x	x	x
R3205	63-07781	820 Ω, carbon	x	x	x	x	x		
R3205	63-7781	820 Ω, film						x	x
R3206	63-10460-50	resistor & splice	x						
	93-2104	12 Ω, wirewound	x						
	91-20530	Washer						x	x
	19-889	splice	x					x	x
		Clip						x	x

Table 4 (Continued)
Main Board (9-227 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-227						
			-00	-01	-02	-03	-04	-05	-05A
R3206	63-10460-50	12 Ω , wirewound		x	x	x	x		
R3210	63-10420-31	2.0 Ω , wirewound	x	x	x	x	x	x	x
R3211	Provision for 1/4 watt resistor		*	*	*	*	*		
R3212	63-10235-72	1 k Ω , film	x		x	x	x	x	x
R3212	63-10235-76	1.5 k Ω , film		x	x	x	x	x	x
R3213 ¹	63-10235-83	3 k Ω , film						x	x
R3213 ¹	63-10235-82	2.7 k Ω , film	x					x	x
R3213 ¹	63-10235-86	3.9 k Ω , film		x	x	x	x	x	x
R3214 ¹	63-10235-175	1.3 k Ω , film	x				x		
R3214 ¹	63-10235-74	1.2 k Ω , film		x	x	x	x	x	x
R3215	63-10244-38	560 k Ω , film,	x				x	x	x
R3215	63-10244-40	680 k Ω , film		x	x	x	x	x	x
R3216	63-10244-25	160 k Ω , film	x	x	x	x	x	x	x
R3217	63-10244-33	360 k Ω , film	x	x	x	x	x	x	x
R3218	63-10235-80	2.2 k Ω , film	x	x	x	x	x	x	x
R3219	63-10244-38	560 k Ω , film		x	x	x	x	x	x
R3222	63-10235-48	47 Ω , film	x	x	x	x	x	x	x
RX3231	63-10422-24	1.0 Ω , wirewound	x	x	x	x	x	x	x
R3233	63-10565-14	3.9 Ω , film	x	x	x	x	x	x	x
R3234	63-10565-14	3.9 Ω , film	x	x	x	x	x	x	x
R3239	63-10244-20	100 k Ω , film	x	x	x	x	x	x	x
R3241	93-2104	Washer						x	x
R3241	63-8246	4 Ω , wirewound						x	x
R3241	63-08246	4.0 Ω , wirewound	x	x	x	x	x		
R3241	19-889	Clip						x	x
R3244	63-10840-40	47 Ω , film	x	x	x	x	x		
R3244	63-10430-64	47 Ω , wirewound						x	x
R3245	63-10710	Thermistor	x	x	x	x	x		
R3245	63-10710	Thermistor						x	x
R3246	63-10657-03	1.2 M Ω						x	x
RX3246	63-10657-03	1.2 M Ω , carbon	x	x	x	x	x		
R3260	63-10243-96	10 k Ω , film		x	x	x	x	x	x
R3261	63-10244-24	150 k Ω , film		x	x	x	x		
R3401	63-10236-46	1.2 M Ω , film	x	x	x	x	x		
R3401	63-10236-18	82 k Ω , film						x	x
R3402	63-10236-22	120 k Ω , film	x	x	x	x	x		
R3402	63-10235-98	82 k Ω , film						x	x
R3403	63-10235-86	3.9 k Ω , film	x	x	x	x	x		
R3404	63-10235-86	3.9 k Ω , film	x	x	x	x	x		
R3405	63-10236-08	33 k Ω , film	x	x	x	x	x		
R3406	63-10235-67	620 Ω , film	x	x	x	x	x		
R3407	63-10236-18	82 k Ω , film	x	x	x	x	x		
R3408	63-10236-04	22 k Ω , film	x	x	x	x	x		
R3409	63-10857-17	100 k Ω , control	x	x	x	x	x		
R3410	63-10236-31	300 k Ω , film	x	x	x	x	x		

1 Some boards R3213 is 63-10936-67, 3.92 k Ω , 1% and R3214 is 63-10936-12, 1.3 k Ω , 1%

Table 4 (Continued)
Main Board (9-227 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-227						
			-00	-01	-02	-03	-04	-05	-05A
R3411	63-10236-03	20 kΩ, film	x	x	x	x	x	x	
R3412	63-10236-13	51 kΩ, film	x	x	x	x	x	x	
R3413	63-10236-07	30 kΩ, film	x	x	x	x	x	x	
R3414	63-10235-98	12 kΩ, film	x	x	x	x	x	x	
R3415	63-10236-02	18 kΩ, film	x	x	x	x	x	x	
R3416	Provision for 1/4 watt resistor		*	*	*	*	*	*	
R3417	63-10243-64	470 Ω, film						x	x
R3417	63-10243-60	330 Ω, film	x	x	x	x	x		
R3418	63-10857-08	2 kΩ, control	x	x	x	*	*		x
R3419	63-10235-84	3.3 kΩ, film	x	x	x	*	*		x
R3420	63-10236-10	39 kΩ, film	x	x	x	x	x	x	
R3421	63-10235-73	1.1 kΩ, film	x	x	x	x	x	x	
R3422	63-10243-64	470 Ω, film	x	x	x	x	x		
R3423	63-10243-64	470 Ω, film						x	x
R3423	63-10243-60	330 Ω, film	x	x	x	x	x		
R3424	63-10235-72	1 kΩ, film	x	x	x	*	*		x
R3425	63-10235-88	4.7 kΩ, film	x	x	x	x	x	x	
R3428	63-10235-82	2.7 kΩ, film	x	x	x	x	x		
R3428	63-10235-74	1.2 kΩ, film						x	x
R3429	63-10235-76	1.5 kΩ, film	x	x	x	x	x	x	
R3431	63-10235-80	2.2 kΩ, film	x	x	x	x	x	x	
R3432	63-10235-79	2 kΩ, film		x	x	x	x	x	
R3432	63-10235-55	200 Ω, film	x						
R3433	63-10236-20	100 kΩ, film	x	x	x	x	x	x	
R3434	63-10236-22	120 kΩ, film	x	x	x	x	x	x	
R3435	63-10235-63	430 Ω, film	x	x	x	x	x	x	
R3436	63-10235-72	1.0 kΩ, film	x	x	x	x	x	x	
R3439	63-10243-79	2 kΩ, film	x	x	x	x	x	x	
R3440	63-10235-86	3.9 kΩ, film	x	x	x	x	x	x	
R3441	63-10857-02	250 Ω, control		x	x	x	x	x	
R3441	63-10857	100 Ω, control	x						
R3442	63-10235-86	3.9 kΩ, film	x	x	x	x	x	x	
R3443	63-10235-80	2.2 kΩ, film		x	x	x	x	x	
R3443	63-10235-65	510 Ω, film	x						
R3444	63-10235-60	330 Ω, film	x	x	x	x	x	x	
R3445	63-10235-80	2.2 kΩ, film	x	x	x	x	x	x	
R3446	63-10235-72	1 kΩ, film		x	x	x	x	x	
R3449	63-10235-76	1.5 kΩ, film	x						
R3449	Provision for 1/4 watt resistor		*	*	*	*	*		
R3451	63-10235-88	4.7 kΩ, film		x	x	x	x	x	
R3451	63-10235-82	2.7 kΩ, film	x						
R3452	63-10235-92	6.8 kΩ, film	x	x	x	x	x	x	

Table 4 (Continued)
Main Board (9-227 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-227						
			-00	-01	-02	-03	-04	-05	-05A
R3453	63-10235-96	10 kΩ, film						x	x
R3453	63-10235-75	1.3 kΩ, film		x	x	x	x		
R3461	63-10236	15 kΩ, film	x	x	x	x	x	x	x
R3462	63-10236-13	51 kΩ, film						x	x
R3462	63-10236	15 kΩ, film	x	x	x	x	x		
R3463	63-10235-89	5.1 kΩ, film	x						
R3463	63-10235-72	1 kΩ, film		x	x	x	x		
R3463	63-10235-48	100 Ω						x	x
R3465	63-10235-72	1 kΩ, film	x	x	x	x	x	x	x
R3466	63-10235-86	3.9 kΩ, film	x	x	x	x	x	x	x
R3467	63-10235-94	8.2 kΩ, film	x	x	x	x	x	x	x
R3468	63-10236-10	39 kΩ, film	x	x	x	x	x	x	x
R3469	63-10235-72	1 kΩ, film	x	x	x	x	x	x	x
R3470	63-10236-16	68 kΩ, film	x	x	x	x	x	x	x
R3471	63-10235-93	7.5 kΩ, film	x	x	x	x	x	x	x
R3471	63-10235-86	3.9 kΩ, film							x
R3473	63-10235-96	10 kΩ, film						x	x
R3473	63-10235-86	3.9 kΩ, film		x	x	x	x		
R3474	63-10235-72	1 kΩ, film		x	x	x	x	x	x
R3472	63-10235-86	3.9 kΩ, film	x	x	x	x	x	x	x
R3475	63-10235-72	1 kΩ, film		x	x	x	x		
W4	63-10235-72	1 kΩ, film						x	x

NOTE: A resistor 63-10236-12, 47 kΩ, 1/4W, 5% is connected between pin 3 and 4 of connector 3D3 (see R0000 on the schematic).

Table 5
**High Voltage and Horizontal Sweep Board
(9-247 Series)**

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	00	A	-04	BOARD LEVEL		
						9-247- -05	-03	-06
Capacitors								
C2131	22-7508	47 μ F, electrolytic		x	x	x		x
C2131	22-7861-08	47 μ F, electrolytic	x				x	
C2152	22-7508-01	22 μ F, electrolytic	x	x	x	x		x
C2152	22-7861-06	22 μ F, electrolytic					x	
CX3202	22-7710-01	1 μ F, electrolytic			x			
CX3202	22-7862-01	1 μ F, electrolytic	x	x		x	x	x
C3203	22-7711-08	47 μ F, electrolytic			x	x		
C3203	22-7863-08	47 μ F, electrolytic	x	x			x	x
CX3204	22-7773-24	0.1 μ F, polyester	x	x	x	x	x	x
CX3205	22-7523-01	.01 μ F, disc	x	x	x	x	x	x
C3206	22-7708-04	4.7 μ F, electrolytic			x	x		
C3206	22-7860-04	4.7 μ F, electrolytic	x	x			x	x
C3207	22-5665	330 pF, disc	x	x	x	x	x	x
C3209	22-7242	.0018 μ F, disc	x	x	x	x	x	x
C3210	22-5995	82 pF, disc	x	x	x	x	x	x
C3211	22-7777-20	.047 μ F, polyester	x	x	x	x	x	x
C3212	22-7234	560 pF, disc	x	x	x	x	x	x
C3213	22-7775-16	.022 μ F, polyester	x	x	x	x	x	x
C3214	22-7775-10	.0068 μ F, polyester	x	x	x	x	x	x
C3216	22-5684	470 pF, disc	x	x	x	x	x	x
C3217	22-5684	470 pF, disc	x	x	x	x	x	x
C3218	22-7774-15	.018 μ F, polyester	x	x	x	x	x	x
CX3219	22-7708-05	10 μ F, electrolytic			x	x	x	x
CX3219	22-7708-09	100 μ F, electrolytic	x	x				
C3222	22-7742-10	.001 μ F, axial	x	x	x	x	x	
CX3228	22-6466	530 pF, ceramic disc	*	*	*	*	x	x
CX3229	22-7672-11	.015 μ F, polypropylene				x	x	
CX3229	22-7672-08	.0165 μ F, polypropylene	x	x				
CX3229	22-7672-12	.014 μ F, polypropylene			x			
CX3231	22-6466	530 pF, ceramic disc	*	*	*	*	x	x
CX3233	22-7128	.68 μ F, polyester	x	x	x	x	x	x
C3244	22-7566-24	0.1 μ F, polyester	x	x	x	x	x	x
C3261	22-7683-01	.68 μ F, polypropylene	x	x	x	x	x	x
C3276	22-7389-04	15 μ F, electrolytic	x	x	x	x	x	x
C3277	22-7710-09	100 μ F, electrolytic		x	x			x
C3277	22-7712-09	100 μ F, electrolytic	x			x	x	

Table 5 (Continued)
High Voltage and Horizontal Sweep Board
(9-247 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL					
			00	A	-04	-05	9-247- -03	-06
Connectors								
3D3	A-9919-26	Cable w/housing assy	x	x	x	x	x	x
3F3	A-9913-29	Cable w/housing assy		x	x	x	x	x
3F3	A-9911-01	Cable w/housing assy	x					
3G3	A-10080	Cable w/housing assy	x	x	x	x	x	x
5H3	A-9911-58	Cable w/housing assy	x	x	x	x	x	x
5X3	A-9939-18	Cable w/housing assy	x	x	x	x	x	x
Miscellaneous								
E3251	52-2240-08	Spark Gap	x	x	x	x	x	x
W1		Wire, 22 gauge	x					
W2		Wire, 22 gauge	x	x	x	x	x	x
	204-840-02	Printed circuit board	x					
	204-840-03	Printed circuit board		x	x	x		x
	204-840-05	Printed circuit board				x		
Diodes								
CR3202	103-142-01	Low voltage	x	x	x	x	x	x
CR3203	103-330	Low voltage	x	x	x	x	x	x
CR3204	103-308	Zener	x	x	x	x	x	x
CR3205	103-305	Damper	x	x	x	x	x	x
CR3206	103-284	Low voltage	x	x	x	x	x	x
CR3207	103-295-01	Low voltage	x	x	x	x	x	x
CR3208	103-295-01	Low voltage	x	x	x	x	x	x
CR3209	103-142-01	Low voltage	x	x	x	x	x	x
CR3210	103-142-01	Low voltage	x	x	x	x	x	x
CR3211	103-142-01	Low voltage	x	x	x	x	x	x
CR3276	103-254-01	Low voltage	x	x	x	x	x	x
Chokes								
L3200	149-333	Iron core					x	
L3207	149-454	Core, ferrite bead	x	x	x	x	x	x
L3220	149-509-01	Core, Ferrite bead	x					

Table 5 (Continued)
High Voltage and Horizontal Sweep Board
(9-247 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL					
			00	A	-04	-05	9-247- -03	-06
LX3261	20-3976	Coil, width	x	x		x		
LX3261	20-3885-01	Coil, width			x		x	x
LX3262	20-3975	Coil, linearity width	x	x		x		
LX3262	20-3945	Coil, linearity width			x		x	x
Resistors								
R2105	63-10235-94	8.2 kΩ, film	x	x	x	x	x	x
R2110	63-10235-64	470 Ω, film	x	x	x	x	x	x
R2111	63-10233-83	3 kΩ, film	x	x	x	x	x	x
R2122	63-10233-96	10 kΩ, film	x	x	x	x	x	x
RX3204	63-10235-80	2.2 kΩ, film	x	x	x	x	x	x
RX3206	63-7805	3.3 kΩ, carbon			x	x	x	x
RX3206	63-7816	5.6 kΩ, carbon	x	x				
RX3207	63-10235-32	22 Ω, film	x	x	x	x	x	x
RX3208	63-10235-80	2.2 kΩ, film	x	x	x	x	x	x
RX3209	63-10235-72	1 kΩ, film	x	x	x	x	x	x
RX3210	63-7805	3.3 kΩ, carbon			x	x	x	x
RX3210	63-7787	1.1 kΩ, carbon	x	x				
RX3211	63-10818	3.0 kΩ, film	x	x	x	x	x	x
RX3213	63-10236-08	33 kΩ, film	x	x	x		*	*
RX3213	(Provision for 63-10236-08)							
*								
RX3214	63-10233-81	2.4 kΩ, film			x	x	x	x
RX3214	63-10233-82	2.7 kΩ, film	x	x				
RX3215	63-10236-02	18 kΩ, film	x	x		x		
RX3215	63-10235-98	12 kΩ, film			x		x	x
RX3216	63-10810-06	1.2 kΩ, film	x	x	x	x	x	x
RX3217	63-7770	470 Ω, carbon	x	x				
RX3217	63-7760	270 Ω, carbon			x	x	x	x
RX3218	63-10235-82	2.7 kΩ, film	x	x	x	x	x	x
RX3219	63-10235-88	4.7 kΩ, film	x	x	x	x	x	x
R3224	63-10243-88	4.7 kΩ, film	x	x	x	x	x	x
R3225	63-10836-68	680 Ω, wirewound	x	x	x	x	x	x
R3226	63-10235-74	1.2 kΩ, film	x	x	x	x	x	x
R3227	63-10235-80	2.2 kΩ, film	x	x	x	x	x	x
RX3228	63-7757	220 Ω, carbon	x	x				
RX3228	63-7736	68 Ω, carbon					x	
RX3228	Wire, 22 gauge				x			x
RX3228	63-7750	150 Ω, carbon				x		

Table 5 (Continued)
High Voltage and Horizontal Sweep Board
(9-247 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL					
			00	A	-04	-05	9-247- -03	-06
RX3235	63-10810	1.1 kΩ, film	x	x	x			
RX3235	63-10810-06	1.2 kΩ, film				x	x	x
R3237		Wire, 22 gauge	x	x	x	x	x	x
RX3240	63-10657-04	10 MΩ, carbon	x	x	x	x	x	x
R3242	63-10243-80	2.2 kΩ, film	x	x	x	x	x	x
R3243	63-10243-80	2.2 kΩ, film	x	x	x	x	x	x
R3244	63-7868	100 kΩ, carbon	x	x	x	x	x	x
R3250	63-10243-71	910 Ω, film	x	x	x	x	x	x
R3251	63-7785	1 kΩ, carbon	x	x	x	x	x	x
R3252		Wire, 22 gauge	x	x	x	x	x	x
R3261	63-10444-86	390 Ω, wirewound	x	x	x	x	x	x
R3262	63-10565-65	510 Ω, film	x	x	x	x	x	x
R3263	63-10565-65	510 Ω, film	x	x	x	x	x	x
R3264	63-10243-71	910 Ω, film	x	x	x	x	x	x
R3279	63-7757	220 Ω, carbon	x	x		x	x	
R3279	63-7729	47 Ω, carbon					x	
R3279	63-7743	100 Ω, carbon			x			x
R3282	63-10235-96	10 kΩ, film	x	x	x	x	x	x
Transformers								
TX3204	95-3581	Sweep				x		
TX3204	95-3667	Sweep			x			
TX3204	95-3603	Sweep	x					
TX3204	95-3603-01	Sweep		x				
TX3204	95-3657	Sweep					x	
T3205	95-3344	Horizontal driver	x	x	x	x	x	x
TX3251	95-3389-06	Pin reactor	x	x		x		
TX3251	95-3389-04	Pin reactor			x		x	x
Transistors								
QX3202	121-975	NPN	x	x	x	x	x	x
QX3204	121-973	PNP shutdown	x	x	x	x	x	x
Q3206	121-1037	NPN forward driver	x	x	x	x	x	x
QX3207	121-975	NPN shutdown	x	x	x	x	x	x
Q3209	121-1040	NPN reverse driver	x	x	x	x	x	x

Table 6

Width Step Board (A-10530)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION
Capacitors		
C1	22-6466	530 pF, ceramic disc
C2	22-6466	530 pF, ceramic disc
C3	22-6466	530 pF, ceramic disc
C4	22-6466	530 pF, ceramic disc
Chokes		
L1	20-4031	120 μ H
L2	20-4031	120 μ H
Connectors		
P1	78-3059	4-circuit shunt
P2	78-3059	4-circuit shunt
Resistors		
R1	63-10271	390 Ω , wirewound
R2	63-10271	390 Ω , wirewound
Miscellaneous		
3S3	A-9941-11 86-799 204-979-01	Cable w/housing assy Terminal pin Printed circuit board

Table 8

High Voltage Power Supply Board

REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION
Capacitors		
CX3211	022-06466	530 pF, disk
CX3221	022-05688	1000 pF, disk
CX3223	022-07523-01	.01 μ F, disk
CX3227	022-06466	530 pF, disk
Chokes		
L3210	149-00454	Core, Ferrite bead
Diodes		
CR3212	103-00339-04	Low voltage
CR3221	103-00312	Low voltage
Miscellaneous		
TX-3202	095-03502-02	Regulator
Resistors		
R3239	063-10852	1 Ω , wirewound
R3240	063-10852-01	.18 Ω , wirewound

Table 7

Horizontal Output Transistor and Bracket Assembly (A-11105)

REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION
Transistor		
Q3208	121-01029-01 078-03080-01	Transistor Transistor socket

Table 9
High Resolution Video Output Board
(9-155-12)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION
Capacitors		
C5101	22-7603-01	10 μ F, electrolytic
C5121	22-7708-08	47 μ F, electrolytic
C5122	22-3512	.01 Ω F, disc
C5123	22-7742-02	220 pF, tubular
C5124	22-7742-02	220 pF, tubular
C5125	22-742	150 pF, tubular
Chokes		
L5101		Wire, 22 guage
L5102	20-3907-12	10 μ H, peaking
L5103	20-3907-12	10 μ H, peaking
L5104	20-3907-12	10 μ H, peaking
L5105	20-3907-11	8.2 μ H, peaking
L5106	20-3907-11	8.2 μ H, peaking
L5107	20-3907-11	8.2 μ H, peaking
Connectors		
5A2	86-799	Pin, connector (4)
5X3	86-799	Pin, connector (1)
5C2	86-799	Pin, connector (5)
5H3	86-799	Pin, connector (2)
Resistors		
R5101	63-10840-79	2 k Ω , film
R5102	63-7750	150 Ω , carbon
R5104	63-10235-48	100 Ω , film
R5105	63-10235-48	100 Ω , film
R5106	63-7785	1 k Ω , carbon
R5108	66-7750	150 Ω , carbon
R5110	63-7750	150 Ω , carbon
R5111	63-7799	2.2 k Ω , carbon
R5112	63-10840-79	2 k Ω , film
R5113	63-10840-79	2 k Ω , film

Table 9 (Continued)
High Resolution Video Output Board
(9-155-12)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION
R5114	63-10235-48	100 Ω , film
R5115	63-10235-48	100 Ω , film
R5119	63-7750	150 Ω , carbon
R5120	63-10235-86	3.9 k Ω , film
R5121	63-10235-92	6.8 k Ω , film
R5122	63-10235-90	5.6 k Ω , film
R5123	63-10235-40	47 Ω , film
R5124	63-10235-40	47 Ω , film
R5125	63-10235-38	39 Ω , film
Transistors		
Q5101	N/A	Assembly, with heat sink
	121-1034	NPN, video out—blue
Q5102	N/A	Assembly, with heat sink
	121-1034	NPN, video out—red
Q5103	N/A	Assembly, with heat sink
	121-1034	NPN, video out—green
Miscellaneous		
W1		22 gauge wire
W2		provision, wire, as needed
W3		22 gauge wire
CRT	A-11056	Assembly, PC board and CRT socket
	78-2993-02	CRT socket
	204-1023-02	Printed circuit board
E5101	52-2240-06	Spark gap
E5102	52-2240-06	Spark gap
E5103	52-2240-06	Spark gap
E5104		Air spark gap

Table 10
Medium Resolution Video Output Board
(9-155-18)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION
Capacitors		
C5101	22-4671	0.01 μ F, ceramic disc
C5102	22-4671	0.01 μ F, ceramic disc
C5103	22-7742-02	220 pF, axial lead
C5104	22-7742-02	220 pF, axial lead
C5105	22-0742-02	220 pF, axial lead
C5106	22-4671	0.01 μ F, ceramic disc
Chokes		
L5102	20-3907-25	Coil, RCF
L5103	20-3907-25	Coil, RCF
L5104	20-3907-25	Coil, RCF
L5105	20-3907-18	Coil, RCF
L5106	20-3907-18	Coil, RCF
L5107	20-3907-18	Coil, RCF
Connectors		
5A2	86-799	Pin, connector (4)
5C2	86-799	Pin, connector (5)
5H3	86-799	Pin, connector (2)
5X3	86-799	Pin, connector (1)
Resistors		
R5101	63-10840-88	4.7 k Ω , film
R5103	63-7785	1 k Ω , carbon
R5104	63-10235-54	180 Ω , film
R5105	63-12035-48	100 Ω , film
R5106	63-7785	1 k Ω , carbon

Table 10 (Continued)
Medium Resolution Video Output Board
(9-155-18)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION
R5107	63-7785	1 k Ω , carbon
R5109	63-7785	1 k Ω , carbon
R5110	63-7785	1 k Ω , carbon
R5111	63-7799	2.2 k Ω , carbon
R5112	63-10840-88	4.7 k Ω , film
R5113	63-10840-88	4.7 k Ω , film
R5114	63-10235-54	100 Ω , film
R5115	63-10235-54	100 Ω , film
R5118	63-7785	1 k Ω , carbon
R5120	63-10235-92	6.8 k Ω , film
R5121	63-10235-92	6.8 k Ω , film
R5122	63-10235-92	6.8 k Ω , film
R5123	63-10235-27	22 Ω , film
R5124	63-10235-27	22 Ω , film
R5125	63-10235-27	22 Ω , film
Transistors		
Q5101	121-01034	NPN, video out—blue w/heat sink
Q5102	121-01034	NPN, video out—red w/heat sink
Q5103	121-01034	NPN, video out—green w/heat sink
	126-02169	Heat sink
Miscellaneous		
W1		wire, 22 gauge
W2		wire, provision as needed
W3		wire, 22 gauge
CRT	A-11056 204-1064-02	DAG wire assembly CRT socket Printed circuit board
E5101	52-2240-06	Spark gap
E5102	52-2240-06	Spark gap
E5103	52-2240-06	Spark gap

Table 11
RGB Gain Control Board (9-356)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NO.	DESCRIPTION
Capacitors		
C1700	22-7860-05	10 μ F, electrolytic
C1701	22-7773-24	0.1 μ F, poly
C1702	22-7773-24	0.1 μ F, poly
C1703	22-7746-16	15 pF, ceramic axial lead
Diodes		
CR1700	103-142-01	Low voltage, silicon
CR1701	103-142-01	Low voltage, silicon
CR1702	103-142-01	Low voltage, silicon
CR1703	103-142-01	Low voltage, silicon
CR1704	103-142-01	Low voltage, silicon
CR1705	103-142-01	Low voltage, silicon
CR1706	103-279-10	Zener, 5.1 volt
CR1707	103-142-01	Low voltage, silicon
CR1708	103-142-01	Low voltage, silicon
CR1709	103-142-01	Low voltage, silicon
Integrated Circuit		
IC1700	221-274	Hex buffer/driver
Resistors		
R1700	63-10235-80	2.2 k Ω , film
R1701	63-10359-64	470 Ω , film
R1702	63-10840-51	130 Ω , film
R1704	63-10235-68	680 Ω , film
R1705	63-10243-38	39 Ω , film
R1706	63-10962	control
R1707	63-10235-72	1 k Ω , film
R1708	63-10235-59	300 Ω , film
R1709	63-10235-59	300 Ω , film
R1710	63-10235-59	300 Ω , film
R1711	63-10235-76	1.5 k Ω , film
R1712	63-10235-76	1.5 k Ω , film
R1713	63-10235-72	1 k Ω , film
R1714	63-10235-53	180 Ω , film
R1715	63-10236-03	20 k Ω , film

Table 11 (Continued)
RGB Gain Control Board (9-356)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NO.	DESCRIPTION
Capacitors		
R1716	63-10236-03	20 k Ω , film
R1717	63-10236-03	20 k Ω , film
R1718	63-10235-72	1 k Ω , film
R1719	63-10235-72	1 k Ω , film
R1720	63-10235-48	100 Ω , film
R1721	63-10235-48	100 Ω , film
R1722	63-10235-48	100 Ω , film
R1724	63-10235-59	100 Ω , film
R1725	63-10235-59	100 Ω , film
R1726	63-10235-59	100 Ω , film
R1727	63-10235-59	100 Ω , film
R1728	63-10235-72	1 k Ω , film
R1729	63-10235-72	1 k Ω , film
R1730	63-10235-72	1 k Ω , film
Diodes		
Transistors		
Q1700	121-1020	NPN
Q1701	121-1019	PNP
Q1702	121-1020	NPN
Q1703	121-1019	PNP
Q1704	121-1019	PNP
Q1705	121-1019	PNP
Q1706	121-895	NPN
Q1707	121-895	NPN
Q1708	121-895	NPN
Q1709	121-1096	NPN
Integrated Circuit		
Resistors		
Miscellaneous		
U1729	105-104	Resistance network, thick film PC board
	204-1279	

Table 12
Audio/Video Sync Board (9-230 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL			
			-01	-02	-03	-05
Capacitors						
C1201	22-7407-01	1 μ F, electrolytic				x
C1201	22-7487-01	1 μ F, electrolytic	x	x	x	
C1203	22-7631-198	27 pF, disc	x			
C1203	22-7633-29	68 pF, disc		x		x
C1204	22-7648-140	28 pF, disc	x	x	x	
C1204	22-7648-14	20 pF, electrolytic				x
C1206	22-7860-09	100 μ F, electrolytic	x	x	x	x
C1207	22-7740-22	.068 μ F, poly	x	x	x	x
C1302	22-7862-01	1 μ F, electrolytic	x	x	x	x
C1303	22-7648-23	47 pF, disc	x	x	x	x
C1304	22-7739-08	.0047 μ F, poly	x	x	x	x
C1451	22-7708-10	220 μ F, electrolytic			x	
C1451	22-7860-09	100 μ F, electrolytic	x		x	
C1452	22-7862-01	1 μ F, electrolytic	x	x	x	
C1455	22-7742-02	220 pF, tubular				x
C1455	22-7744-02	220 pF, axial lead	x	x	x	
C1456	22-7563-28	.22 μ F, poly	x	x	x	
C1457	22-7613-12	1000 pF, disc	x	x	x	
C1459	22-7861-10	220 μ F, electrolytic	x			x
C1459	22-7709-12	470 μ F, electrolytic			x	
C1460	22-7708-06	22 μ F, electrolytic	x	x		
C1460	22-7860-06	22 μ F, electrolytic				x
C1461	22-7775-20	.047 μ F, poly	x	x	x	
C1462	22-7708-08	47 μ F, electrolytic	x	x		
C1462	22-7860-08	47 μ F, electrolytic			x	
C1463	22-7742-06	470 pF, axial lead	x	x	x	
C1467	22-7739-26	.15 μ F, poly	x	x	x	
C1468	22-7710-02	2.2 μ F, electrolytic	x	x		
C1468	22-7862-02	2.2 μ F, electrolytic			x	
C1701	22-7859-10	220 μ F, electrolytic	x	x	x	x
C1702	22-7405-02	2.2 μ F, electrolytic	x	x	x	x
C1703	22-7742	150 pF, axial lead	x	x	x	x
C1704	22-7743-18	18 pF, axial lead	x	x	x	x
C1705	22-7743-18	18 pF, axial lead	x	x	x	x
C1706	22-7743-18	18 pF, axial lead	x	x	x	x
C1707	22-7563-28	.22 μ F, poly		x	x	x
C1708	22-7563-28	.22 μ F, poly	x	x	x	
C1709	22-7775-24	.1 μ F, poly			x	
C1710	22-7775-24	.1 μ F, poly			x	

Table 12 (Continued)
Audio/Video Sync Board (9-230 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-230			
			-01	-02	-03	-05
C1711	22-7740-28	.22 μ F, poly		x	x	x
C1712	22-7740-28	.22 μ F, poly		x	x	x
C1717	22-7563-20	.047 μ F, poly			x	
C1718	22-7860-08	47 μ F, electrolytic		x	x	x
C1719	22-7707-09	100 μ F, electrolytic	x			
C1719	22-7859-09	100 μ F, electrolytic		x		x
C1719	22-7706-09	100 μ F, electrolytic			x	
C1720	22-7860-09	100 μ F, electrolytic	x	x	x	x
C1721	N/A	Capacitor w/sleeve assy		x	x	x
C1722	22-7859-05	10 μ F, electrolytic		x	x	x
C1723	22-7621-30	68 pF, disc				x
C1723	22-76121-30	68 pF, disc	x	x	x	
C1724	22-7309-10	10 μ F, electrolytic		x	x	
C1850	22-7773-14	.015 μ F, poly		x	x	x
C2215	22-7742-05	390 pF, axial lead	x	x	x	x
C2251	22-7862-01	1 μ F, electrolytic	x	x	x	x
C2252	22-7859-07	33 μ F, electrolytic				x
C2253	22-7742-10	1000 pF, axial lead	x	x	x	x
C2257	22-7742-10	1000 pF, axial lead	x	x	x	x
C2281	22-7390-05	.33 μ F, electrolytic	x	x	x	
C2281	22-7862-22	.33 μ F, electrolytic				x
C2282	22-7621-32	82 pF, disc			x	
C2282	22-7621-34	100 pF, disc	x			
C2282	22-7633-35	120 pF, disc		x		x
C2283	22-7743-20	22 pF, axial lead	x	x		x
C2284	22-7775-24	.1 μ F poly	x	x	x	x
C2351	22-7860-05	10 μ F, electrolytic				x
C2354	22-7742-10	1000 pF, axial lead	x	x	x	x
C2355	22-7621-27	51 pF, disc	x	x	x	x
C2356	22-7743-24	33 pF, axial lead	x	x	x	x
C2358	22-7742-10	1000 pF, axial lead	x	x	x	x
C2359	22-7621-11	11 pF, disc	x	x	x	x
C2362	22-7862-24	1.5 μ F, electrolytic	x	x	x	x
C2376	22-7743-25	36 pF, axial lead	x			
C2376	22-7746-18	18 pF, axial lead			x	
C2376	22-7747-33	75 pF, axial lead		x		x
C2377	22-7749-32	68 pF, axial lead	x	x	x	x
C2378	22-7742-10	1000 pF, axial lead	x	x	x	x

Table 12 (Continued)
Audio/Video Sync Board (9-230 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-230			
			-01	-02	-03	-05
C2379	22-7710-02	2.2 μ F, electrolytic	x	x		
C2379	22-7862-02	2.2 μ F, electrolytic			x	x
C2381	22-7742-10	1000 pF, axial lead	x	x	x	x
C2382	22-7579-05	1.5 μ F, electrolytic	x	x	x	
C2382	22-7862-24	1.5 μ F, electrolytic				x
C2384	22-7710	.47 μ F, electrolytic	x	x	x	
C2384	22-7862	.47 μ F, electrolytic				x
C2385	22-7613-12	1000 pF, disc	x	x	x	x
C2386	22-7749-32	68 pF, axial lead	x	x	x	x
C2388	22-7742-10	1000 pF, axial lead	x	x	x	x
C2389	22-7743-25	36 pF, axial lead	x	x	x	x
C2390	22-7859-08	47 μ F, electrolytic	x	x	x	x
C2392	22-7503-01	820 pF, disc	x	x	x	x
C2393	22-7775-24	.1 μ F, poly	x	x	x	x
C2394	22-7747-30	56 pF, axial lead	x			
C2401	22-7742-10	1000 pF, axial lead	x			
C2402	22-7859-07	33 μ F, electrolytic	x			
C2403	22-7742-10	1000 pF, axial lead			x	
C2411	22-7742-02	220 pF, axial lead			x	
C2412	22-7749-31	62 pF, axial lead			x	
Diodes						
CR1301	103-142-01	Low voltage	x	x	x	x
CR1701	103-254-01	Low voltage	x	x	x	
CR1701	103-284	Low voltage				x
CR1703	103-142-01	Low voltage		x	x	x
CR1704	103-142-01	Low voltage		x	x	x
CR1705	103-142-01	Low voltage		x	x	x
CR1706	103-142-01	Low voltage		x	x	x
CR1707	103-142-01	Low voltage		x	x	x
CR1708	103-142-01	Low voltage		x	x	x
CR1709	103-142-01	Low voltage		x	x	x
CR1710	103-142-01	Low voltage		x	x	x
CR1711	103-142-01	Low voltage		x	x	x
CR1712	103-142-01	Low voltage		x	x	x
CR1713	103-142-01	Low voltage		x	x	x
CR1714	103-142-01	Low voltage		x	x	x
CR1715	103-336-11	Zener, 5.6 volt	x	x	x	x
CR1719		Wire, 22 gauge	x	x	x	
CR1720		Wire, 22 gauge	x	x	x	
CR1721		Wire, 22 gauge	x	x	x	
CR1722	103-142-01	Low voltage		x	x	x
CR1724	103-254-01	Low voltage		x	x	x

Table 12 (Continued)
Audio/Video Sync Board (9-230 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-230			
			-01	-02	-03	-05
CR1725	103-301-13	Zener, 9.1 volt		x	x	x
CR1726	103-142-01	Low voltage		x	x	x
CR1727	103-142-01	Low voltage		x	x	x
CR1728	103-142-01	Low voltage		x	x	x
CR2254	103-142-01	Low voltage	x	x	x	x
CR2255	103-142-01	Low voltage	x	x	x	x
CR2256	103-142-01	Low voltage	x	x	x	x
CR2356	103-15201	Oscillator, 3.58 MHz	x	x	x	x
Delay Line						
D2426	224-16	Delay line, ultrasonic			x	
Integrated Circuits						
IC1301	221-105	Signal sync scan processor	x	x	x	x
	78-3014-02	socket	x	x	x	x
IC1451	221-98	Audio, monolithic		x	x	x
IC1701	221-290	RGB gain control		x	x	
	78-3014-02	socket	x	x		
IC1701	221-290-01	RGB gain control				x
IC1702	221-130	5-transistor array	x	x	x	x
	78-3014-02	socket	x	x	x	x
IC2376	221-179-01	Chroma/luminance processor	x	x	x	x
	78-3014-07	socket	x	x	x	x
Chokes						
LX1201	20-3831-01	Filter	x	x	x	x
L1202	28-3907-16			x		
L1202	20-3907-16	coil				x
L1202	28-3907-17		x			
L1202		Wire, 22 gauge			x	
L1701	20-3887-16	coil	x	x	x	
L1701	20-3887-16	coil				x
L1702	20-3887-16	coil	x	x	x	
L1702	20-3907-16	coil				x
L1703	20-3887-16	coil	x	x	x	
L1703	20-3907-16	coil				x

Table 12 (Continued)
Audio/Video Sync Board (9-230 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-230			
			-01	-02	-03	-05
L1704		Wire, 22 gauge		x	x	
L1704	91-2053	Wire, 22 gauge				x
LX1705	20-3801-01	Filter	x	x	x	
LX1705	20-3831-01	Filter				x
LX1706	20-3801-01	Filter	x	x	x	
LX1706	20-3831-01	Filter				x
L2276	20-3997	Delay line	x			
L2276	20-4135	Delay line			x	
L2276	20-4136	Delay line		x		x
L2277	20-3907-17				x	
L2277	20-3907-19		x			
L2277	20-3907-21			x		x
L2278	20-3919	Tunable	x	x		x
L2278	20-3919	Tunable				x
L2376	45-3080	Transformer	x	x	x	
L2376	95-3080	Transformer				x
L2377	20-3831	Filter				x
L2378	20-3887-20	coil	x	x	x	x
L2401	20-3887-17	coil			x	
L2402	20-3907-17				x	
L2403		Wire, 22 gauge			x	
L2427	20-3904	Tunable, tint centering			x	
Transistors						
Q1202	121-986	PNP	x	x	x	x
Q1203	121-895	NPN	x	x	x	x
Q1204	121-895	NPN	x	x	x	x
Q1701	121-895	NPN	x	x	x	x
Q1702	121-895	NPN	x	x	x	x
Q1703	121-895	NPN	x	x	x	x
Q1704	121-895	NPN	x	x	x	x
Q1705	121-895	NPN	x	x	x	x
Q1706	121-895	NPN	x	x	x	x
Q1707	121-895	NPN	x	x	x	x
Q1708	121-1019	PNP		x	x	x
Q1709	121-1019	PNP		x	x	x
Q1710	121-1019	PNP		x	x	x
Q1711	121-1019	PNP	x	x	x	x
Q1712	121-1019	PNP	x	x	x	x
Q1713	121-1019	PNP	x	x	x	x
Q1714	121-1019	PNP		x	x	x
Q1715	121-1019	PNP		x	x	x
Q1716	121-1019	PNP		x	x	x
Q1717	121-1084	NPN		x	x	x

Table 12 (Continued)
Audio/Video Sync Board (9-230 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-230			
			-01	-02	-03	-05
Q1718	121-1084	NPN		x	x	x
Q1719	121-1084	NPN		x	x	x
Q1720	121-1084	NPN		x	x	x
Q1721	121-1084	NPN		x	x	x
Q1722	121-1084	NPN		x	x	x
Q1723	121-1096	NPN		x	x	x
Q1726	121-1096	NPN		x	x	x
Q1727	121-895	NPN		x	x	x
Q1728	121-1096	NPN	x	x	x	
Q1728	121-1064	PNP				x
Q1729	121-499-01	NPN		x	x	x
Q1730	121-499-01	NPN		x	x	x
Q1731	121-1019	PNP		x	x	x
Q1732	121-1019	PNP		x	x	x
Q1733	121-1019	PNP		x	x	x
Q1734	121-499-01	NPN		x	x	x
Q1735	121-1019	PNP		x	x	x
Q1736	121-1084	NPN		x	x	x
Q1737	121-1019	PNP		x	x	x
Q1738	121-551	NPN		x	x	x
Q1739	121-895	NPN		x	x	x
Q1740	121-1019	PNP		x	x	x
Q1741	121-1019	PNP		x	x	x
Q1742	121-1019	PNP		x	x	x
Q1743	121-1019	PNP		x	x	x
Q1744	121-895	NPN	x	x	x	x
Q1745	121-895	NPN	x	x	x	x
Q1746	121-895	NPN	x	x	x	x
Q2215	121-699	PNP	x	x	x	x
Q2401	121-895	NPN		x		
Q2402	121-895	NPN			x	
Q2403	121-895	NPN			x	
Q2405	121-895	NPN			x	
Q2426	121-895	NPN			x	
Resistors						
R1204	63-10235-88	4.7 kΩ, film				x
R1207	63-10235-65	510 Ω, film	x	x	x	x
R1209	63-10235-88	4.7 kΩ, film	x	x	x	x
R1211	63-10235-73	1.1 kΩ, film	x	x	x	x
R1212	63-10235-84	3.3 kΩ, film	x	x	x	x
R1213	63-10235-88	4.7 kΩ, film	x	x	x	x

Table 12 (Continued)
Audio/Video Sync Board (9-230 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-230			
			-01	-02	-03	-05
R1214	63-10235-86	3.9 kΩ, film	x	x	x	x
R1216	63-10235-78	1.8 kΩ, film				x
R1217	63-10235-70	820 Ω, film	x	x	x	x
R1301	63-10236-26	180 kΩ, film	x	x	x	x
R1302	63-10235-74	1.2 kΩ, film	x	x	x	x
R1303	63-10235-80	2.2 kΩ, film	x	x	x	x
R1304	63-10236-20	220 kΩ, film	x	x	x	x
R1306	63-10236-05	33 kΩ, film	x	x	x	x
R1451	63-10235-78	1.8 kΩ, film		x		x
R1451	63-10235-32	Control			x	
R1452	63-10235-76	1.5 kΩ, film		x	x	x
R1453	63-10236-04	22 kΩ, film		x	x	x
R1454	63-10243	1 Ω, film		x	x	x
R1455	63-10235-46	82 Ω, film		x	x	x
RX1457	63-10235-46	82 Ω, film		x	x	
RX1457	63-10836-46	82 Ω, film				x
RX1457	63-10848-02	56 Ω, film			x	
R1463	63-10235-80	2.2 kΩ, film		x	x	x
R1464	63-10236-12	47 kΩ, film		x	x	x
R1701	63-10235-88	4.7 kΩ, film	x	x	x	x
R1702	63-10235-75	1.3 kΩ, film	x	x	x	x
R1703	63-10235-66	560 Ω, film	x	x	x	x
R1704	63-10235-48	100 Ω, film	x	x	x	x
R1705	63-10235-79	2 kΩ, film	x	x	x	x
RX1706	63-10565-07	2 Ω, film	x	x	x	x
R1707	63-10235-83	3 kΩ, film	x	x	x	x
R1708	63-10857-11	Control	x	x	x	x
R1709	63-10235-01	2.4 kΩ, film	x	x	x	
R1709	63-10235-81	2.4 kΩ, film				x
R1710	63-10235-83	3 kΩ, film	x	x	x	x
R1711	63-10235-52	150 Ω, film	x	x	x	x
R1712	63-10235-83	3 kΩ, film	x	x	x	x
R1713	63-10235-83	3 kΩ, film	x	x	x	x
R1714	63-10857-31	Control	x	x	x	x
R1715	63-10235-01	2.4 kΩ, film	x	x	x	
R1715	63-10235-81	2.4 kΩ, film				x
R1716	63-10236	15 kΩ, film	x	x	x	
R1716	63-10236-03	20 kΩ, film				x
R1717	63-10235-85	3.6 kΩ	x	x	x	x
R1718	63-10235-48	100 Ω, film		x	x	x
R1719	63-10235-77	1.6 kΩ, film	x			x
R1719	63-10235-82	2.7 kΩ, film				
R1720	63-10235-77	1.6 kΩ, film		x	x	
R1720	63-10235-80	2.2 kΩ, film				x

Table 12 (Continued)
Audio/Video Sync Board (9-230 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL			
			-01	-02	-03	9-230 -05
R1721	63-10235-98	12 kΩ, film	x	x	x	x
R1722	63-10235-79	2 kΩ, film	x	x	x	x
R1723	63-10235-77	1.6 kΩ, film	x			x
R1723	63-10236-82	2.7 kΩ, film		x	x	
R1724	63-10235-77	1.6 kΩ, film		x	x	
R1724	63-10235-80	2.2 kΩ, film				x
R1725	63-10235-98	12 kΩ, film	x	x	x	x
R1726	63-10235-79	2 kΩ, film	x	x	x	x
R1727	63-10235-77	1.6 kΩ, film	x			x
R1727	63-10235-82	2.7 kΩ, film				
R1728	63-10235-77	1.6 kΩ, film		x	x	
R1728	63-10235-80	2.2 kΩ, film				x
R1729	63-10235-98	12 kΩ, film	x	x	x	x
R1730	63-10235-79	2 kΩ, film	x	x	x	x
R1731	63-10235-88	4.7 kΩ, film		x	x	x
R1732	63-10235-88	4.7 kΩ, film		x	x	x
R1733	63-10235-88	4.7 kΩ, film		x	x	x
R1734	63-10235-48	100 Ω, film		x	x	x
R1735	63-10235-48	100 Ω, film		x	x	x
R1736	63-10235-48	100 Ω, film		x	x	x
R1737	63-10235-72	1 kΩ, film		x	x	x
R1738	63-10235-83	3 kΩ, film		x	x	x
R1739	63-10235-72	1 kΩ, film		x	x	x
R1740	63-10235-01	2.4 kΩ, film		x	x	
R1740	63-10235-81	2.4 kΩ, film				x
R1741	63-10235-79	2 kΩ, film		x	x	x
R1742	63-10235-01	2.4 kΩ, film		x	x	
R1742	63-10235-81	2.4 kΩ, film				x
R1743	63-10235-84	3.3 kΩ, film		x	x	x
R1744	63-10235-01	2.4 kΩ, film		x	x	
R1744	63-10235-81	2.4 kΩ, film				x
R1745	63-10235-72	1 kΩ, film		x	x	x
R1746	63-10235-80	2.2 kΩ, film				x
R1746	63-10235-88	2.2 kΩ, film		x	x	
R1747	63-10235-96	10 kΩ, film		x	x	x
R1748	63-10235-96	10 kΩ, film		x	x	x
R1749	63-10235-96	10 kΩ, film		x	x	x
R1750	63-10235-96	10 kΩ, film		x	x	x
R1751		Wire, 22 gauge		x	x	
R1751	91-2053	Wire, 22 gauge				x
R1752		Wire, 22 gauge		x	x	
R1752	91-2053	Wire, 22 gauge				x
R1753		Wire, 22 gauge		x	x	
R1753	91-2053	Wire, 22 gauge				x

Table 12 (Continued)
Audio/Video Sync Board (9-230 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-230			
			-01	-02	-03	-05
R1755	63-10235-86	3.9 kΩ, film		x	x	x
R1756	63-10235-96	10 kΩ, film		x	x	x
R1757	63-10235-92	6.8 kΩ, film		x	x	x
R1758	63-10235-90	5.6 Ω, film		x	x	x
R1759	63-10235-96	10 kΩ, film		x	x	x
R1760	63-10235-92	6.8 kΩ, film		x	x	x
R1761	63-10235-56	220 Ω, film		x	x	x
R1762	63-10235-86	3.9 kΩ		x	x	x
R1763	63-10235-90	5.6 Ω, film		x	x	x
R1764	63-10235-56	220 Ω, film		x	x	x
R1765	63-10235-48	100 Ω, film		x	x	x
R1766	63-10235-48	100 Ω, film		x	x	x
R1767	63-10235-31	300 kΩ, film		x	x	
R1767	63-10236-31	300 kΩ, film				x
R1767	63-10235-31	300 kΩ, film		x	x	
R1768	63-10236-17	75 kΩ, film				x
R1768	63-10235-18	82 kΩ, film		x	x	
R1769	63-10235-02	18 kΩ, film		x	x	
R1769	63-10235-06	27 kΩ, film				x
R1770	63-10235-72	1 kΩ, film		x	x	x
R1771	63-10235-38	39 Ω, film			x	
R1771		Wire, 22 gauge	x			
R1772	63-10934-96	681 Ω, film				x
R1772	63-10934-97	698 Ω, film		x	x	
R1773	63-10235-76	1.5 kΩ, film		x	x	x
R1775	63-10235-76	1.5 kΩ, film		x	x	x
R1776	63-10934-96	681 Ω, film		x	x	x
R1778	63-10235-76	1.5 kΩ, film		x	x	x
R1779	63-10934-96	681 Ω, film		x	x	x
R1780	63-10235-72	1 kΩ, film		x	x	x
R1781	63-10936-04	1.1 kΩ, film				x
R1781	63-10936-85	1.13 kΩ, film		x	x	
R1782	63-10936-84	1.1 kΩ, film		x	x	x
R1783	63-10243-58	270 Ω, film				x
R1783	63-10243-59	300 Ω, film		x	x	
R1784	63-10936-84	1.1 kΩ, film		x	x	x
R1785	63-10934-96	681 Ω, film		x	x	x
R1786	63-10235-68	680 Ω, film		x	x	x
R1787	63-10235-72	1 kΩ, film		x	x	x
R1788	63-10235-72	1 kΩ, film		x	x	x
R1789	63-10935-48	27.4 kΩ, film		x	x	
R1789	63-10938-48	27.4 kΩ, film				x
R1790		Wire, 22 gauge		x	x	

Table 12 (Continued)
Audio/Video Sync Board (9-230 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-230			
			-01	-02	-03	-05
R1791	63-10938-75	46.4 kΩ, film		x	x	
R1791	63-10938-81	51.1 kΩ, film				x
R1791	63-10938-75	46.4 kΩ, film	x	x		
R1792	63-10235-88	4.7 kΩ, film	x	x	x	
R1793	63-10235-60	330 Ω, film	x	x	x	
R1794	63-10235-66	560 Ω, film	x	x	x	
R1795	63-10235-95	9.1 kΩ, film	x	x	x	
R1796	63-10235-86	3.9 kΩ, film	x	x	x	
R1797	63-10235-76	1.5 kΩ, film	x	x	x	
R1799	63-10934	100 Ω, film				x
R1799	63-10934-81	102 Ω, film	x	x		
R1800	63-10235-48	100 Ω, film	x	x		
R1800	63-10934	100 Ω, film			x	
R1801	63-10235-48	100 Ω, film	x	x		
R1803	63-10934	100 Ω, film			x	
R1803	63-10235-48	100 Ω, film	x	x		
R1804	63-10235-82	4.7 kΩ, film				x
R1804	63-10235-88	4.7 kΩ, film	x	x		
R1805	63-10235-76	1.5 kΩ, film	x	x	x	
R1806	63-10235-82	2.7 kΩ, film				x
R1806	63-10235-88	4.7 kΩ, film	x	x		
R1807	63-10235-76	1.5 kΩ, film	x	x	x	
R1808	63-10235-82	2.7 kΩ, film			x	
R1808	63-10235-88	4.7 kΩ, film	x	x		
R1809	63-10235-76	1.5 kΩ, film	x	x	x	
R1810	63-10235-48	100 Ω, film		x	x	
R1811	63-10235-95	9.1 kΩ, film	x	x	x	
R1812	63-10235-83	3 kΩ, film	x	x	x	
R1815	63-10235-01	2.4 kΩ, film	x	x		
R1815	63-10235-81	2.4 kΩ, film			x	
R1816	63-10235-70	820 Ω, film	x	x	x	
R1817	63-10235-60	330 Ω, film	x	x	x	
R1818	63-10235-72	1 kΩ, film	x	x	x	
R1819	63-10235-72	1 kΩ, film	x	x	x	
R1820	63-10235-79	2 kΩ, film	x	x	x	
R1821	63-10235-60	330 Ω, film	x	x	x	
R1822	63-10235-78	1.8 kΩ, film	x	x	x	
R1823	63-10235-80	2.2 kΩ, film	x	x	x	
R1824	63-10235-93	7.5 kΩ, film	x	x	x	
R1825	63-10235-64	470 Ω, film	x	x	x	
R1826	63-10235-76	1.5 kΩ, film	x	x	x	
R1827	63-10235-80	2.2 kΩ, film	x	x	x	
R1829	63-10235-72	1 kΩ, film		x		
R1830	63-10236	15 kΩ, film	x	x	x	x

Table 12 (Continued)
Audio/Video Sync Board (9-230 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL			
			-01	-02	-03	-05
R1831	63-10235-72	1 kΩ, film		x	x	x
R1832	63-10857-06	Control				x
R1832	63-10857-86	Control		x		
R1832	63-10857-88	Control			x	
R1833	63-10235-96	10 kΩ, film		x	x	x
R1834	63-10832-32	22 Ω, film				x
RX1834	63-10832-32	22 Ω, film		x	x	
R1835	63-10235-60	330 Ω, film		x	x	
R1835	63-10243-60	330 Ω, film				x
R1836	63-10857-15	Control		x	x	x
R1837	63-10235-80	2.2 kΩ, film				x
R1837	63-10235-90	5.6 Ω, film		x	x	
R1838	63-10235-87	4.3 kΩ, film	x	x	x	x
R1839	63-10235-87	4.3 kΩ, film	x	x	x	x
R1840	63-10235-87	4.3 kΩ, film	x	x	x	x
R1841	63-10235-01	2.4 kΩ, film		x	x	
R1841	63-10235081	2.4 kΩ, film				x
R1842	63-10235-48	100 Ω, film	x	x	x	x
R1843	63-10235-48	100 Ω, film	x	x	x	x
R1844	63-10235-48	100 Ω, film	x	x	x	x
R1845		Wire, 22 gauge	x	x	x	
R1845		Wire, 22 gauge				x
R1846		Wire, 22 gauge	x	x	x	
R1846		Wire, 22 gauge				x
R1847	63-10236	15 kΩ, film	x	x	x	
R1848	63-10235-72	1 kΩ, film	x	x	x	
R1849	63-10235-96	10 kΩ, film	x	x	x	
RX1850	63-10918-02	47 Ω, wirewound				x
R2215	63-10235-78	1.8 kΩ, film	x	x	x	x
R2216	63-10236-12	47 kΩ, film	x	x	x	x
R2251	63-10235-74	1.2 kΩ, film	x	x	x	x
R2254	63-10235-66	560 Ω, film	x	x	x	
R2254	63-10236-38	560 kΩ, film				x
R2255	63-10235-84	3.3 kΩ, film	x	x	x	x
R2256	63-10235-72	1 kΩ, film	x	x	x	x
R2257	63-10235-72	1 kΩ, film	x	x	x	x
R2276	63-10235-74	1.2 kΩ, film	x	x	x	x
R2278	63-10235-78	1.8 kΩ, film	x	x	x	x
R2285	63-10235-96	10 kΩ, film	x	x	x	x
R2286	63-10235-72	1 kΩ, film	x	x	x	x
R2287	63-10236	15 kΩ, film	x	x	x	x
R2288	63-10236-38	560 Ω, film				x
R2288	63-10235-66	560 Ω, film	x	x	x	
R2297	63-10235-91	6.2 kΩ, film	x	x	x	x
R2298		Wire, 22 gauge		x		
R2298		Wire, 22 gauge				x

Table 12 (Continued)
Audio/Video Sync Board (9-230 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL			
			-01	-02	-03	9-230 -05
R2354	63-10235-64	470 Ω , film		x	x	x
R2355	63-10235-70	820 Ω , film	x	x	x	x
R2356	63-10235-70	820 Ω , film	x	x	x	x
R2357	63-10235-94	8.2 k Ω , film	x	x	x	x
R2358	63-10235-72	1 k Ω , film	x	x	x	x
R2376	63-10235-62	390 Ω , film				x
R2376	63-10235-71	910 Ω , film		x		x
R2376	63-10235-72	1 k Ω , film	x			
R2378	63-10235-94	8.2 k Ω , film	x	x	x	x
R2379	63-10235-65	510 Ω , film	x	x	x	x
R2381	63-10235-64	470 Ω , film	x	x	x	x
R2382	63-10236-04	22 k Ω , film				x
R2382	63-10236-84	22 k Ω , film	x	x	x	
R2383	63-10235-48	100 Ω , film	x	x	x	x
R2385	63-10235-84	3.3 k Ω , film	x	x	x	x
R2387	63-10235-64	470 Ω , film	x	x	x	x
R2388	63-10236-46	1.2 M Ω , film	x	x	x	x
R2389	63-10235-88	4.7 k Ω , film	x	x	x	x
R2390	63-10857-12	Control	x	x	x	x
R2391	63-10235-92	6.8 k Ω , film				x
R2401	63-10235-92	6.8 k Ω , film				x
R2402	63-10235-65	510 Ω , film				x
R2403	63-10235-96	10 k Ω , film				x
R2404	63-10235-76	1.5 k Ω , film				x
R2405	63-10235-61	360 Ω , film				x
R2407	63-10235-72	1 k Ω , film				x
R2408	63-10235-65	510 Ω , film				x
R2410	63-10235-52	150 Ω , film				x
R2411	63-10235-65	510 Ω , film				x
R2413	63-10235-68	680 Ω , film				x
R2415	63-10235-88	2.2 k Ω , film				x

Table 12 (Continued)
Audio/Video Sync Board (9-230 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION	BOARD LEVEL 9-230			
			-01	-02	-03	-05
R2426	63-10857-04	Control			x	
R2427	63-10235-59	300 Ω , film			x	
R2428	63-10235-59	300 Ω , film			x	
R2429	63-10235-48	100 Ω , film			x	
R2432	63-10857-02	Control			x	
R2433	63-10235-52	150 Ω , film			x	
R2434	63-10235-52	150 Ω , film			x	
R2437	63-10235-66	560 Ω , film			x	
R2438	63-10235-64	470 Ω , film			x	
R2439	63-10235-76	1.5 k Ω , film			x	
Miscellaneous						
SW001	85-1628	Slide switch		x		
SW001	85-1628-01	slide switch			x	
DB-25	78-3096-02	Connector, 25 position			x	
	78-3096-01	Connector, 15-position		x		
	69-346-03	Screw, machine				
	4-40 \times .150			x	x	
	54-952-02	Nut, machine 4-40 \times .250	x			

Table 13
Secondary Control Assembly (A-9522 Series)

CIRCUIT REFERENCE DESIGNATOR	ZDS PART NUMBER	DESCRIPTION
Capacitors		
C7101		Provision for capacitor (not used)
Resistors		
R7101	63-10750	Control, 5 kΩ, picture
R7102	63-10754	Control, 5 Ω, black level
R7103	63-10751	Control, 5 kΩ, color level
R7104	63-10751	Control, 5 kΩ, tint
R7126	63-10235-87	4.3 kΩ, film
R7127	63-10235-82	2.7 kΩ, film
R7128	63-10235-78	1.8 kΩ, film
R7131	63-10857-87	Control, 5 kΩ, brightness
R7132	63-10235-72	1 kΩ, film
R7133	63-10235-72	1 kΩ, film
R7134	63-10235-72	1 kΩ, film
R7136	63-10235-72	1 kΩ, film
R7137	63-10235-72	1 kΩ, film
Wires		
W1		Wire, 22 gauge
W2		Wire, 22 gauge
W3		Wire, 22 gauge
Cables		
2A7	A-9919-43	Cable to 9-230-01
2B7	A-9917-46	Cable to 9-230-01
	A-10231	Cable to light sensor
	A-10322	Cable to LED
PC BOARD		
	204-895-10	PC board

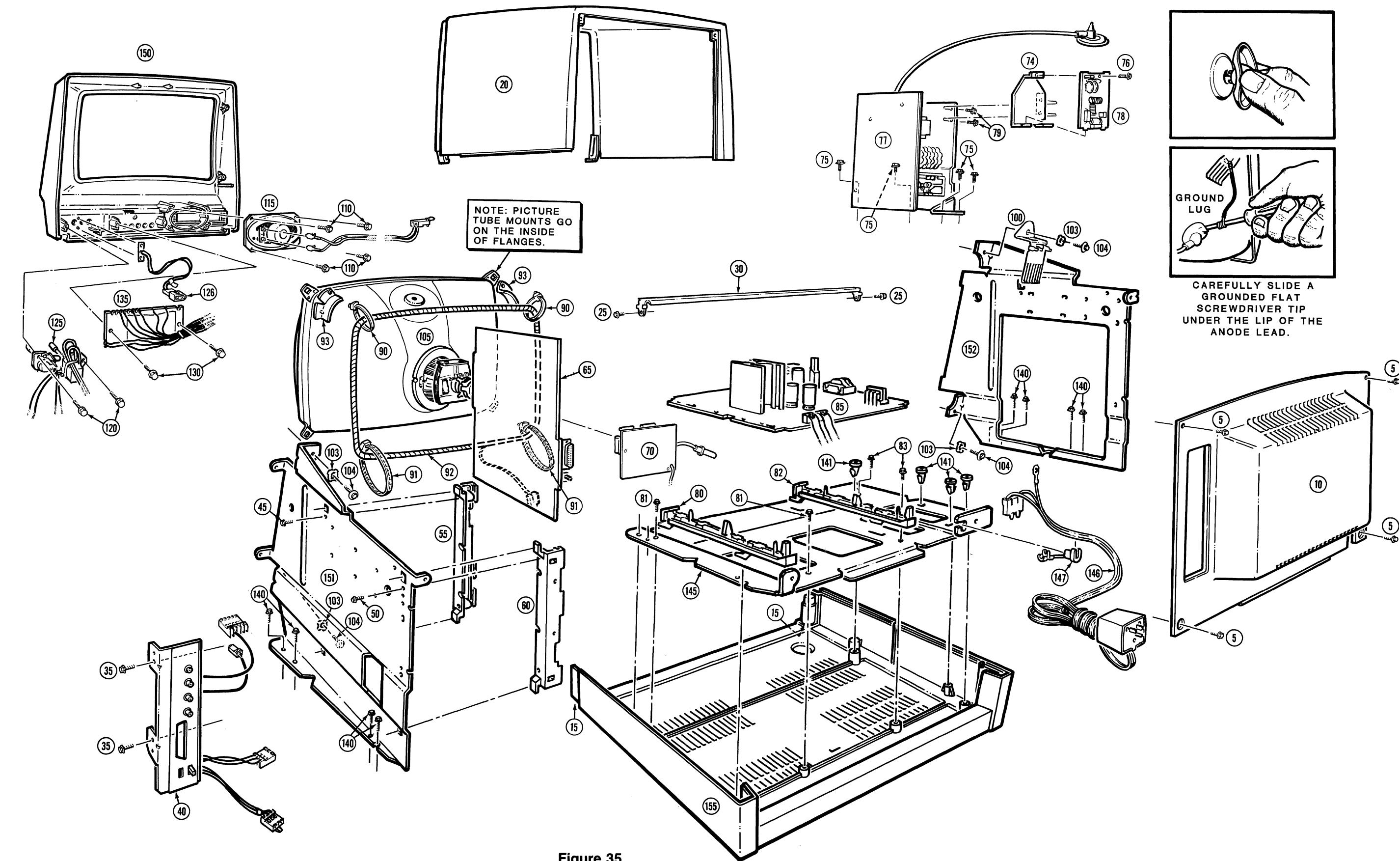


Figure 35
Monitor Exploded View